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ELECTRICAL WORLD

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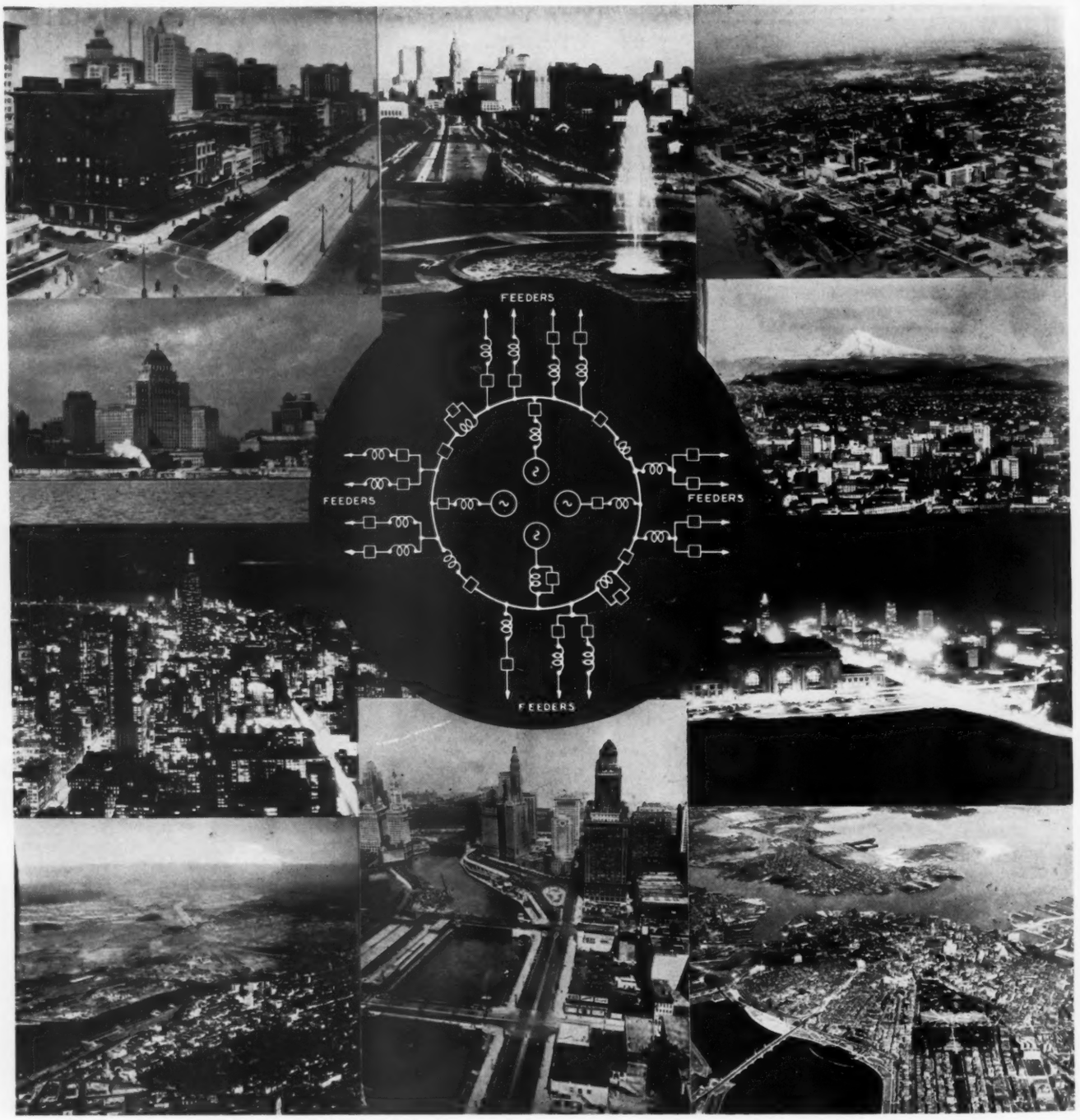

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ELECTRICAL WORLD

JUNE 18, 1938

The Will to Grow

The strength of a country, the strength of an industry, the strength of a business lies within itself and not without. Ever since the stock market crash in the fall of 1929 American business has been looking for a saviour. Only when times began to improve did it rise up and have ideas of its own once more. And now that business is off again, business is once more looking for external help. If only such and such, or so and so, were to happen, business could once more go ahead.

Well, maybe it could, but what if these things do not happen?

For the past six years the utility industry has had not only to weather the depression but the added burden of an antagonistic Administration. But it has survived. Its business has grown. The strong anti-utility public sentiment engendered by the government in 1933 has, according to the record, passed its peak. Bond issues are selling at the lowest yields in the history of the industry. In fact, in a great many respects the utility industry is stronger today than it has been at any time since the war.

In spite of antagonistic government activities, the industry can continue to grow stronger and greater provided its leaders will look ahead and not be bowed down by the doleful present. This industry is not going to be swallowed up by public ownership. That for some time there will be more, rather than less, is unquestioned, but even so, in the aggregate, what will it amount to?

And that threat can without too much difficulty be viewed as an asset rather than a liability. It is much the same as low price competition in other fields of business. It should act as a stimulant to so serve the public and at such rates that there could never be any question of public ownership.

The effect of the past six years has been something like eating spinach. It's not so bad after you get used to it. Ten, fifteen years ago the utility industry was soft. It thought it was pretty good, but it had really never had to exert itself strongly. Since then it has had to face some new realities, to meet which it developed many latent abilities. And the most outstanding achievements were made where the adversity was strongest.

No help is coming to the utility industry from the outside. Conditions under which the industry operates have definitely changed. This change can be for the worse or the better, depending entirely upon the industry. If utilities sit back and wait for something to happen, it will, only it won't be pleasant. On the other hand, if they recognize that the way out is through the creation of more business, they will be amazed at the results, even in times of depression.

There is nothing to stop this business from doubling again in the next ten years. And if it does, the energy which public ownership generates, and which looks so big today, will be but a drop in the bucket. How the money will be found to finance this expansion is not known, but we have a feeling it will be available as and when needed.

The times challenge the industry. Let the lawyers watch Washington and the State Capitols. Let the bankers watch Wall Street. But let the utility operators keep their eyes on the future that is ahead of this industry and work to expand the business.

Nothing can take the place of private initiative when private initiative really gets busy.

The President's Address

Report on the State of the Industry Records the Main Developments of the Year Affecting the Utility Industry's Future

By C. W. KELLOGG*
President of the Edison Electric Institute

THE annual report of the president performs a two-fold function—to report on the state of the industry and to serve as a record for the future of the main developments of the year.

The Institute year now ending has witnessed the registration with the Securities and Exchange Commission under the Public Utility Holding Company Act of practically all such companies in this country. At the suggestion of Chairman Douglas of the commission, a committee representing the principal holding companies has been set up to co-operate with the commission in the study of possible reintegration of the existing utility groups and of the regulatory provisions of the act.

It is, of course, too early yet for any tangible result to emerge from this co-operative effort, but conferences have begun and the gesture itself should be of happy augury for our industry. One of the principal things the utilities have suffered from in recent years has been a punitive attitude by the federal government. The removal of this threat will help greatly to enable the utilities to perform efficiently their essential public service rôle in the life of the people, and Chairman Douglas' words and actions indicate a clear desire to do just that. The utilities may be counted upon to meet this proffered co-operation in the same spirit that prompted it. It is devoutly to be hoped that the same co-operation may be obtained from other government departments whose activities intimately affect the industry.

While the electric utility industry will be found most willing to co-operate with the government in the regulation provided by the Public Utility Holding Company Act, the outcome of the Electric Bond & Share cases cannot, as a matter of current history, be passed by without comment. It should be stated for the record that the original promise of a test of the constitutionality of the act was not carried out in the trial of the Bond & Share cases. It will be recalled that in the autumn of 1935 (the holding company act having become law on August 26 of that year) most of the utility holding companies, on the advice of their counsel, filed suits to test the constitutionality of the act and that subsequently, on November 26 of that year, the S.E.C. filed its mandamus suits against the

* Address delivered at E.E.I. Convention.

President Kellogg (on stage) opens a general business session of the annual convention

Electric Bond & Share Company. The government then sought to have all the other cases held in abeyance, claiming that the Bond & Share cases would cover all the issues. As late as March 27, 1936 (four months after the filing of these cases), the United States, in its brief before the Supreme Court in opposition to the granting of a writ of certiorari in another test case, said, at page 23 of the brief, in referring to the Bond & Share cases, that they "*will offer a truly adequate case to test the constitutionality of the act.*" This has been prefaced by the statement (page 21 of the brief) that

The government has always conceived that it has a duty to the public, the Congress, and the affected holding companies to test the act promptly.

and that (in the same paragraph)

No fairer or broader test of the act could be suggested

than the Bond & Share cases.

After having, through these and similar representations, succeeded in getting all other cases quashed or quieted, the government then proceeded in the actual trial of the Electric Bond & Share cases to resist the effort of these companies to have the validity of the act passed on by the trial court, the Court of Appeals or the Supreme Court, and succeeded in simmering the cases down to the separability of two sections of the act.

Throughout this decade the attack on the electric industry by the government has been well-nigh continuous. At first it was confined largely to publicity statements about the findings of the Federal Trade Commission, but during recent years the publicity has been reinforced by huge cash subsidies from the federal treasury, in the form of gifts of more than $150,000,000 to municipalities to compete with their local utilities. Actual seizure of private utility property by the government, without just compensation, would be instantly recognized by the average citizen as contrary to constitutional rights. The public did not at first recognize, although I believe it is coming to do so, that destructive competition, through tax-supported subsidy, has exactly the same effect as actual seizure. Until this realization became general public opinion, the only defense the companies had was to strive to do a continually better, more efficient and more economical job in service to the people.

What we have accomplished, so far as figures can reveal it, I have just stated. What the public thinks about our performance is best evidenced by their votes. You will recall in this connection that analysis of the 22,638,000 votes cast in 540 local elections during the last five years on the subject of municipal ownership shows the per cent of votes favoring municipal ownership to have dropped from 70.5 per cent in 1933 to 11.5 per cent in 1937.

I have spoken of the more appreciative attitude of the public toward our service. It can hardly be said that this same attitude has yet been shown in the matter of government competition. Since our last convention the Federal Power Commission has issued its findings on cost allocation at Bonneville Dam on the Columbia River, indicating that for the initial installation only 22 per cent of the cost will be charged to electric power, the balance going against the taxpayer for navigation. In the case of T.V.A., the authority has not yet complied with the statutory requirement to file cost allocations with Congress, but its spokesman, before the House appropriations committee, in April last year, estimated about 37½ per cent allocable to electricity. It is not for us to say whether subsidies of this magnitude are or are not wise public policy, but as operators we can say definitely that they prevent the operation of an electric plant so subsidized from being any accurate measure (yardstick, footrule or any other) of what it would cost a private enterprise not so subsidized to produce power.

Finance

The effect of the inability of our industry as a whole to raise capital funds through the sale of equity securities has continued to be obscured by the relative stagnation in business. The favorable volume of business in the latter part of 1936 and the early part of 1937 was too short-

at Atlantic City's auditorium. More than 1,200 members of E.E.I. were registered

lived to have any lasting effect, and today finds industrial activity back at levels comparable with the darkest parts of the 1930 to 1935 depression. The short spurt, while it lasted, however, showed up the limitations on financing which our industry will face if and when normal business activity is resumed.

Farm electrification

We have been making long strides in farm electrification in recent years and at the present time about 1,300,000 farms are taking electric service, or 20.2 per cent of the farms with occupied dwellings and 30 per cent of those with dwellings valued at $500 or more. If all farms with occupied dwellings within reach of existing lines took service, the 20 per cent would be raised to 25 per cent. The average farm electrification of about 20 per cent varies widely throughout the nation—from 95 per cent in the small, densely populated state of Rhode Island and 90 per cent in California to only 2½ per cent in Mississippi and 3 per cent to 4½ per cent in Arkansas and the Dakotas.

The federal government since 1935 has appropriated for rural electrification a total of $98,599,000, part of a grand total of $427,000,000 to be spent over eleven years ending in 1946. Pending appropriation bills now before Congress carry $100,000,000 in addition to the $40,000,000 authorized for this year.

Rural electrification in America and abroad

It is the practice of some government officials to disparage the progress of rural electrification in the United States, perhaps to justify federal subsidies for rural electrification. Because misleading statements are repeated from time to time, I wish to state some facts showing America's leadership in rural electrification, a development which our industry pioneered.

The only published comprehensive statistics on farm electrification are for the United States and Canada. Information on farm electrification in other countries is based upon estimates, with a few actual figures for very limited areas. The published figures for foreign countries relate to total electrification, urban and rural combined, and not to farm electrification, and in general are based not upon the number of customers actually taking service but upon the families to whom service has allegedly been made available. In France, for example, villages within two miles of electric lines are reported as being "served" with electricity. Such a criterion would greatly increase all of our percentages.

Merely being connected to electric lines is not, however, the final test of rural electrification; use enters as an important factor. The United States, with an average use per farm customer in excess of 1,000 kw.-hr. a year, and a wide variety of farm applications of electricity, holds unquestioned leadership in farm electrification compared with any other country in the world, even with the dairying country of New Zealand. In European countries, judging from miscellaneous reports on consumption and on percentage of household appliances in use, farm consumptions of 200 to 300 kw.-hr. per year are very general and uses of 25 to 50 kw.-hr. per year are not uncommon.

I have no wish to belittle the efforts of foreign countries in carrying electricity to rural populations (undoubtedly they have troubles of their own to contend with), but in fairness to rural electrification in America I wish to point out how unjust and misleading have been the attacks on American progress in this field.

Diesel engines

For many years we have had Diesel competition for much of our industrial and large commercial business. In spite of this competition we have witnessed enormous growth of industrial power sales. The production and sales of the "packaged Diesel unit" by General Motors means that this competition will now be extended to include smaller industrial customers and the larger field of medium-sized commercial customers. We may expect increased competition for loads of from 10 to 100 hp., in which classification is found a considerable portion of our commercial and industrial customers. No significant change in the character of the Diesel engine itself has occurred recently, but the introduction of a company with extensive sales and servicing facilities adds a new element in the competition. The intensity of this competition is likely to increase as other manufacturers endeavor to capitalize on the increase in Diesel publicity and advertising. Much of our industrial business has been retained largely as a result of a policy of frequently seeing the individual customer and point out to him the real and specific advantages of purchased power in his business. This will undoubtedly become sound business practice with our smaller commercial customers. Let us never forget that flexibility, reliability and convenience are still strong economic considerations for the American citizen in appraising any kind of service.

Adequate wiring program

Last December the Institute formulated a number of specific proposals for changes in the wiring code which, if adopted and applied generally, must result in a very substantial improvement in wiring adequacy. These proposals, subject only

Edison Institute headquarters group at the annual banquet

to working out the details, have recently been approved by the National Electrical Manufacturers Association. There has been misunderstanding, particularly on the part of the electrical workers and electrical contractors, but also on the part of electrical inspectors, both as to our purpose in offering these proposed changes and also the effect of the proposals themselves.

Assuming you all agree as to the desirability of wiring improvements and of code changes to bring them about, I want to remind you of your responsibility in the matter. The task of your representatives on code-making bodies will be much simpler, and favorable action on their proposals will be expedited, if every electric utility in its own territory is alert to demonstrate the advantages of proposed improvements, and to apply them, in so far as it is able to obtain approval to do so from local enforcing authorities—if not in the larger cities, then in the smaller ones which it serves. Code rules follow, they do not precede, practice. If each utility leaves it to others to do the pioneering work progress is bound to be slow. Our industry, in my opinion, is deeply indebted to the Detroit Edison Company, to the American Gas & Electric Company and other such pioneering companies for the substantial progress that has been made in the past ten years in wiring practice and for the promise of much greater progress immediately before us.

Work of the committees

There never has been a time when the industry was better mobilized to make educational and promotional sales advances. The usability of electricity is being impressed upon people by joint effort of the four branches of our industry and by numerous other associations and groups which have joined us in gaining a common objective. There has been a change in the approach toward the sale of electric services. For example, lighting is not now a question of utility only, but a matter of eyesight preservation and better health. The architect, the builder and occupants of buildings are becoming impressed with an appreciation of the modernity of electrical equipment and the value of style in its use. Ensemble selling for the kitchen and the laundry makes the householder conscious of a complete unit of electrical equipment for these important work centers. Two of our national co-ordinated sales activities, namely, the Better Light—Better Sight Program and the Running Water Program for rural customers, are in their fifth year and are still making advances. The Modern Kitchen Program is the most comprehensive sales promotion plan ever undertaken by the industry, and it is not surprising, in view of these sales activities, that domestic consumption continues to increase in spite of these months of economic stress.

Regional associations

The Institute itself does not, as did its predecessor organization, organize and operate regional groups, but the activities of such groups, locally organized and operated, are of much value to all the companies involved. Great as is its aggregate size, our industry is essentially a local enterprise everywhere, the average trip of a kilowatt-hour from the cradle to the grave being but 26 miles. The many local problems can best be discussed by and at regional meetings.

There are twenty-two such state or regional associations in the country that have held conventions this year. Besides the information and experience they disseminate, they are a most useful place for the meeting of minds and the discovery of leadership among the younger members of our organization—the men who will be the guides of the industry in the future. To my mind it is healthier to have these organizations locally inspired and directed than it would be to have them mere branches of the Institute itself and run from New York.

The spirit of service

It has been for me an engrossing and inspiring task during the last two years to get about to all sections of the country to meet with the operating forces of our member companies. I have found them often bewildered and discouraged at the attitude of the government toward our industry, but continuing to carry on loyally in devotion to the public service. Everywhere this spirit of service prevails. It is one of the greatest assets of our business, and although it does not appear on our balance sheets, it represents great value to our stockholders, our employees and our customers. This loyalty and devotion to the public service, sometimes to the point of risking life itself, is something that raises our industry far above the level of ordinary business. It is a tradition which we must never lose, for so long as we keep it we shall be good public servants, and shall thus find a happy and useful outlet for all our energies—whether from our power plants, our brains or our hearts.

George Hughes (left), president Edison General Electric Appliance Company, presents the Hughes Award for 1938 to E. J. Kirkpatrick and Arnold Hogan of Indiana General Service Company, Muncie. Checks for $1,000 go with the silver trophy

Ten Ways to Make Customers Like Your Company

Widespread Misinformation Must Be Corrected and Relations With Customers Based Upon Friendship

By J. E. DAVIDSON*
President Nebraska Power Company, Omaha

IT IS easy to be general. It is easy to say, "Be courteous, give good service, etc." But I am going to be specific. Let me present to you ten ways to win public approval of your company.

No. 1—Every company must dedicate itself to even greater civic responsibilities. True, electric utility companies have always had a civic consciousness, but we must intensify our efforts along these lines. We must make every citizen of every community we serve feel that we are "part and parcel" of that community. The need is greater now than ever before for *local operating authority*. Local managers must be local managers in fact as well as in name.

No. 2—Not only must we be civic conscious but we must assume community leadership. The business of your company is not confined to producing and distributing electric energy. You owe to the communities you serve *greater* civic participation than the average citizen.

No. 3—Humanize your company. Of what does your company consist? Of turbo-generators, poles, real estate, ledgers, desks, and so on? These are merely the "bare bones" of an electric company. More important are the individuals who constitute the personnel. These persons must bring to their daily work not only active brains but warm hearts filled with concern for others. They must be inspired with a genuine spirit of public service. Only then does a company become a living, breathing entity.

No. 4—Be courageous and aggressive, but be tolerant. Your company has a good story to tell. Tell it well, but give to the opinions of others the respect you too desire. If people have been misled, convert them.

No. 5—Know what your customers are thinking. Learn the opinion of the public, in the territory you serve. Not only will knowledge of this opinion provide you with valuable information as to the trend of thought but it will furnish you also with the *reason* for that trend—and that is even *more* important. Find out what your customers like, and do more of it; find out what they don't like, and do less of it.

No. 6—Check carefully the form letters that your company mails out. Perhaps this appears a trite suggestion, but you may find, to your surprise, that some of your form letters have not been changed for the past five or ten years. Put your form letters in tune with the modern way of thinking. Give them up-to-date personalities.

J. E. Davidson

No. 7—It's good business to practice selectivity in load building, but it is very *poor* business to practice selectivity in public relations building. See to it that your company's messages reach all of your customers.

No. 8—Maintain careful supervision over your emergency calls. We might sometimes overlook this important department because practically all emergency calls occur after office hours and on holidays. These calls will gain friends for your company—if they are cared for with courtesy and dispatch — because when customers put in emergency calls they are in trouble, and they greatly appreciate prompt and efficient service.

No. 9—Intensify the good work you are doing among your dealers and contractors. Elbert Hubbard once wrote: "Co-operation, not competition, is the life of business." Bear in mind that one dealer-knocker can tear down public relations work as fast as you can build it, for your customers accept as authoritative statements made by electrical dealers and contractors. Make of these dealers boosters, rather than knockers.

No. 10—Show a genuine interest in your customers, not for a day or a month, but year in and year out. There are many ways to indicate such interest. They demand long hours of arduous work, but the recompense is great.

* Abstract of E. E. I. convention paper.

The Challenge to Business Leadership

Social Problems of Era Must Be Recognized and Corrected by Business Men

By Dr. VIRGIL JORDAN*

President National Industrial Conference Board, New York

THE underlying conditions in this country and in most of the world are very unhealthy and unstable. We find ourselves again, or still, in severe depression, the deepest and most prolonged in our history. The difficulties in the way of making sound recovery and resuming stable progress under our business and political system are more serious than we have ever faced in our generation, and more serious than most people in this country are yet able to understand.

At this crucial moment American business should file its criticisms and complaints for future reference and turn to the active task of reconstruction. It should make no more vague, indefinite and conditional offers of co-operation with government. It should come forward to the American people with an unconditional pledge and a specific program to re-employ our labor and to rehabilitate our industries, step by step during the next two years, and it should then demand the aid of government in certain specific ways to that end.

It should mobilize itself and proceed to this definite task in the traditional and sound American way, by industrial and local organization along state lines under the inspiration and supervision of a national reconstruction council of business leaders in whose capacity management has confidence. In each state the existing business and labor organizations and the state governments should create a state re-employment council which should assume three specific responsibilities of action.

First—It should secure from all employers in the state pledges of re-employment during the next two years of a determined number of employable persons.

Second—It should establish and operate adequate facilities for re-training and rehabilitation of workers not employable because of loss of skill and long unemployment, using in part private resources and in part public work relief funds for this purpose.

Third—It should constitute itself an advisory and supervisory agency to assist in the effective administration of public funds for direct relief and work relief within the state, with co-ordinated subcommittees in each community.

When these state and local organizations have been established and this mechanism of private action is in operation then, and then only, the national council should present to Congress and to the public a specific statement of the assistance which is required of the federal government for the effective accomplishment of this effort. Such a statement should specify the financial assistance required for retraining and rehabilitation facilities, for transportation and relocation of employable workers, for part payment of wages of people re-employed, for financing of working capital requirements of individual enterprises, as well as modifications in federal taxation and other legislation which are necessary in order to aid business management in discharging the responsibility which it has assumed.

It must go farther than this. It must proceed, in a spirit of political appeasement and conciliation, to try step by step to build a basis of contact, discussion and co-operation with government and labor wherever there is any chance of their assistance.

National co-operation needed

To carry out this program a gigantic national effort in private co-operation will be necessary. It will require the mobilization of all existing business organizations, all effective agencies of publicity, all resources of information and all the initiative and public-spirited effort of the business community. All the potential capacity of American business leadership must be brought to bear toward the single national purpose, which is to fulfill a specific and concrete pledge to the American people, independently of government and with only such assistance of government as the manifest sincerity of the pledge will compel. That pledge must be made in utter good faith, and any assistance of government and labor toward its fulfillment must be asked and accepted likewise in good faith.

We still have an opportunity in America to eliminate unemployment and provide stable and growing prosperity for all our people within the framework of enterprise and civil liberty, but only business can do this, and it can compel government to help if it plays its hand intelligently, courageously and with unity. At this moment the great majority of the American people, with the tragic spectacle of Europe and Asia before their eyes, hesitate desperately before the fatal decision of dictatorship, and if they feel there is half a chance to get what they want without it they will choose the American way. Business should not let this momentous decision be made for them by default.

* Abstract of E.E.I. convention paper.

Utility Industry to Double Over Ten-Year Period

Expenditures of $1,000,000,000 to $1,750,000,000 per Year Predicted to Meet Service Needs During the Next Decade of National Prosperity

By A. H. KEHOE*
Vice-President Consolidated Edison Company, New York

THE COST of electricity has received so much public attention in recent years that discussion of any of the individual elements entering into costs should be carefully circumscribed to be certain that existing confusion concerning the subject will be reduced thereby rather than increased. As a broad subject, of course, the cost of electricity to the consumer must include not only the amount paid to the utility for electric service, but also the amount for utilization wiring. This latter money, for the large part, is capital invested in wiring and equipment; but some part of it is for maintenance of such utilization system. While the tremendous amount of money in the aggregate that is required for consumers to pay for utilization equipment merits every one's attention, this discussion will be limited to the part paid to public utilities for electric service. Last year this revenue was about $2,180,000,000—a gain of 6.7 per cent over 1936.

The costs necessary to provide our service have to be recovered from the service supplied, and since as regulated public utilities we are to charge rates that will bring in this amount, every one is advantaged by reduction in such costs. In making this review, trends will be indicated where possible reductions might be expected in the future. It will be assumed that the well-recognized means of making past reductions by increasing and diversifying the use of the service will be continued, for electricity production and use, to a greater degree than most other materials or services, reacts to the mass production principle of greater use producing lower unit costs.

From the analysis of cost of the various divisions of plant, which will be discussed later, it now seems reasonable to expect that the unit cost of total plant investment will be reduced if additions in capacity are required under circumstances existing at the present time. It must be noted, however, that up to date the experience has been that increases, rather than decreases, have resulted in the average unit cost as increases in capacity have been required.

Doubling of capacity to meet increased demands in the span of a few years has occurred again and again in the industry. The most recent case was in the seven-year period from 1924 to 1930, when the capacity of the privately operated electric supply companies in the United States was about doubled and the total investment in the properties was slightly more than doubled. In the following seven-year period, 1931 to 1937, it had been possible to meet the demands of consumers for electric service by providing about a 10 per cent increase in both system capacity and investment over 1930. In the latter period about $190,000,000 new capital had been used on the average each year in comparison with an average of $832,000,000 per year during the earlier seven-year period; that is, with a ratio of yearly expenditure before 1930 about $4.40 for every $1 per year since that time.

Of a total of approximately $13,000,000,000 of plant investment, there was invested in our generating stations at the end of 1937 more than $4,800,000,000, the installed capacity being about 35,000,000 kw. With an investment of less than half of this amount in 1920, the unit cost per kilowatt of net installed capacity had been reduced from $162 in 1920 to $138 in 1937. This investment can be divided into two parts—the hydro and the fuel-burning stations.

Hydro-generating capacity has been maintained at slightly more than one-quarter of the total since 1920. At present it is approximately 27½ per cent of the total, and the investment in hydro stations is about 37½ per cent of the total invested in generating stations. This hydro

*Abstract of E.E.I. convention paper.

capital on an average unit price per kilowatt installed has been reduced from $250 per kilowatt in 1920 down to $187 per kilowatt in 1937.

With reference to steam-generating plants, it is well known that great improvements in efficiency were effected in the 1920-30 decade. The higher efficiency obtained from year to year with units of large capacity and the ability to make use of these larger-sized units as system loads increased caused many to believe that early supersession of much of our power plant equipment was to be expected. Certainly for a while these developments pointed to higher depreciation rates for steam-generating stations than the experience of the industry had indicated prior to 1920. However, in the past few years the necessary technical achievements have been realized for the successful utilization of steam temperatures and pressures much higher than was possible when most of the present available capacity was installed. This has changed the outlook entirely. Materials and processes have been perfected under service conditions, and it is now possible to add new capacity at reasonable costs, with only moderate retirement costs, and at the same time make a very appreciable improvement in the operating economy in a large percentage of existing steam power plants.

In considering the logical plant divisions, transmission and substations are often combined owing to the prevalence of high-tension transmission lines and the substations for transformation which are required due to change in voltage. These both had a remarkable growth during the period from 1920 to 1930, and this development has been largely responsible for the rapid increases in the transmission and subtation divisions of plant investments. From about $480,000,000 invested in transmission lines in 1920, the expansion of this type of plant was exceedingly rapid until 1930, when the rate of increase became more gradual. At present there is more than $1,800,000,000 invested in transmission. Similarly, substation increases went from $415,000,000 in 1920 to $1,600,000,000 in 1937. It now seems probable that future expansion of capacity will not require as large an increase in these investments as in the past.

Distribution, including the services to the premises of our consumers, is the one subdivision of the physical plant investment of our companies which because of the quantity of equipment used and repetition of operations performed in rendering service should conform to the law of lower unit cost resulting from repeated operations. However, due to other developments which affect plant cost, the average experience has been that distribution system costs have continued to increase per kilowatt of generating capacity installed. In 1920 the average was $57, in 1930 it had increased to $82 and in 1937 a further increase to $89 was experienced. While the dollars invested per kilowatt of generating capacity may not be the most favorable unit to use in making comparisons of distribution cost, it has an advantage in showing the weight which distribution investment has as compared to the entire plant. In 1920 it was but 17½ per cent of total investment; in 1930 it increased to 22.7 per cent, and then to 24.1 per cent in 1937.

In reviewing the causes of the continued increase in average distribution plant investment per kilowatt of generating capacity, the fact should be noted that a substantial degree of standardization has been accomplished without lowering these average costs. Furthermore, the trend of prices for the materials and labor going into distribution plant will not account stastically for the increases. All show some variation —some down, the majority up—but taking into account the change in methods brought about by the standardization, it seems clear that we have not lost ground when installing like capacity under like conditions. The changes which have taken place, I believe, are due to the general expansion in the distribution field which has been taking place in all directions.

Summing up the foregoing considerations, it is my guess that, when the next period of great expansion comes along, the cost of adding plant capacity equal in amount to that which we have today should be substantially less than the total cost of providing the plant we now have; possibly a third less. This represents the possibilities and is based on our present scale of prices. Rising cost factors over which we have little or no control may offset these possibilities. Nevertheless, if we are to maintain our place in the vanguard of progress, we must be alert to use every advance in technology and, while maintaining our high standards of service, we must continue to strive for lower costs of plant, so that when these periods of expansion come we may be still better prepared to seize the opportunity they may afford to improve system costs.

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Concerning the prospect for the future growth, there is a widespread expectation in the industry that during the next period of national prosperity new uses of electric service and, more particularly, expanding consumer acceptance of the relatively large capacity utilization equipment of types now in use will very likely make it necessary to provide additional system capacity in, say, a ten-year period, comparable in amount with that provided up to date. Such a sustained growth would represent an average annual increase of less than 7¼ per cent per year. Using present unit costs for an estimate, this would result in total plant investments at the end of the period of $26,000,000,000. It would require, at these present costs, annual net capital additions starting at approximately a billion dollars per year and increasing to about one and ¾ billion per year at the end of such ten-year term. Our purpose in discussing such possible rate of growth is to point out trends which may have a determining influence on the amount and use of the new capital funds that would be needed to provide system capacity for a new decade of prosperity, similar to that from 1920 to 1930.

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Capitalism Without Capital

"Capitalistic Economy" System Disappeared in 1930—Incongruities of Present Prove Need for Return to Enterprise System

By Dr. W. W. CUMBERLAND*
Economist, Wellington & Company, New York

NO ATTEMPT will be made to determine whether the economic philosophy of recent years is or is not preferable to that followed by the United States from earliest days to 1930. But most business men fail to realize that the American system of free enterprise is gone, that we no longer live in a capitalistic economy. This is self-deception. It ignores the conclusive evidence that the United States as a capitalistic economy became insolvent in 1930 or 1931, has continued in that condition and is becoming increasingly insolvent from year to year.

Three great industries have roughly measured economic improvement in the United States—the railroads, the utilities and new construction. American railroads have been able to obtain no equity capital since 1930. Utilities have been able to obtain only $26,000,000 of equity capital from 1932 to date. New construction for many years has proceeded at a fraction of computed normal requirements. These three major industries largely determine whether activity or stagnation will characterize an extensive group of related industries. In the aggregate the position of these industries gives the final answer as to whether we have prosperity or depression.

There is no longer any doubt about the magnitude of the present depression. This depression is essentially the handiwork of government. Economic and financial distortions are largely absent. Reasons why business cannot prosper are obvious. They center around tax burdens which are out of proportion with national income, and particularly onerous on corporate income; labor legislation and its administration, which encourage inefficiency and irresponsibility; competition by government with its own citizens; price fixing and credit manipulation, and replacement of competence and responsibility in business management by governmental restrictions applied arbitrarily and with political objectives. Not one of these causes of the depression has been remedied or is even in process of solution.

In spite of the length and depth of the depression, no evidence can be cited that positive and permanent improvement is imminent. New capital issues are few in number and for the most part represent efforts by corporations to defend their competitive positions, not to extend capacity or introduce new products. As almost all of these issues now take the form of senior securities it is evident that the financial structure of American corporations is progressively being impaired.

Moreover, such business improvement as now appears possible is not based on increasing pressure of investment funds and increasing demand for goods, but on desperate monetary and credit policies. Activity induced by these measures is neither wholesome nor permanent. No prospects exist for satisfactory business until this country is willing to accept the fundamentals which produce capital formation and its productive employment.

During the years following 1930 enterprise capital has been moribund. Yet the population enjoyed the same amount of food, the usual quantity of clothing, though perhaps of somewhat lower quality; attended as many movies and burned as much gasoline. Consumption in general has not declined. But the drastic shift in the national attitude toward enterprise and the creation of wealth has not only terminated capital formation but has resulted in actual shrinkage of pre-existing capital.

"Planning" vs. enterprise

At least from 1930, and possibly before that date, the United States abandoned the capitalistic system. It was replaced by what is euphemistically called "economic planning." Therefore we have no recent experience as to whether or not capitalism has failed, because we have not been operating under that system. Predictions are impossible in regard to the likelihood of new investments, of business improvement, of corporate profits and of improving national income, because free enterprise no longer prevails. Business men and investors no longer reason and calculate upon the possibility of producing goods and rendering services with a net return to themselves, but upon the chances of outguessing the master-planners, of retaining operating authority in their own plants and of devising methods of escaping such ruinous taxation that operations become completely impossible.

At the present moment there are no indications that our population is ready to demand the conditions under which capitalism can function. We regard an increasing national debt as an asset and as a motivating force for business recovery; we consider the currency not as a medium of exchange but as an instrument with which to control prices, regulate employment and mold national industry to some predetermined program; we seek prosperity by destroying wealth. When this curious mechanism of incongruities and fallacies refuses to function we say that capitalism has failed. In reality we are only affording convincing proof that there can be no capitalism without capital.

* Abstract of E.E.I. convention paper.

Building for the Future Through Residential Sales

Summary of Sales Opportunities Open in Lucrative Field — Cultivation Can Bring Increased Net and Vastly Improved Customer Relations

By DAVIS M. De BARD*

Vice-President Stone & Webster Service Corporation, New York

IN 1937 residential sales amounted to only 17 per cent of the total kilowatt-hours sold in this country. Therefore, I suppose I should not feel that my assignment to talk to you on that subject is of much importance. Certainly it is not anything about which you could be expected to be wildly excited. But perhaps the reason I have the assignment is because somebody knew this to be a subject on which I am most enthusiastic. And that enthusiasm is sincere. My one hope is that I can communicate some of it to you. I believe this subject is the most important one we have to deal with. Frankly, I believe our very existence depends upon how we treat it.

We all know that our residential customers last year bought only 17 per cent of the kilowatt-hours we sold. But the facts that interest me are:

1. Those customers comprise 80 per cent of all our customers.

2. They provide more of our revenue than any other class of customers we have.

3. They all bring more grief; they are the basic source of our rate and political interference difficulties.

Should we not have more "power" salesmen for the home? For the future, shouldn't we think more of selling the service as we sold the power idea in the factory? Certainly our customers must have more spigots if they are to drink of this great fountain of energy which can be made so much a part of their everyday lives. But we can't sell those spigots as such. We must sell the convenience and use of them.

So you see that, just to hold our own, with the customers we now have and the appliances they now have, we must do a vigorous job of promoting the use of new spigots to provide for a steady flow of juice. Therefore, our problem of building for the future becomes even more difficult. And what is the answer?

I find it. I believe. in an analysis of the bills of a wide variety of customers. You will not find it in balance sheets or in profit and loss statements or in graphs showing gains in revenue or output or numbers of customers. You will find it in spread curves showing the consumption per customer in each bracket from 20 kw.-hr. per month up. When you find, as I am sure you do, that more than 70 per cent of your customers use less than 50 kw.-hr. per month, the answer becomes apparent. You have a lot of unsold customers that should be sold more. And there lies the real opportunity for building for the future in residential sales.

There are something like 22,000,000 wired homes in this country today; 70 per cent of these make a total of approximately 15,000,000. These average a use of less than 50 kw.-hr. per month. As a matter of fact, the average for this 15,000,000 is probably not much over 30 kw.-hr. per month. If this group could be induced to use only 2 kw.-hr. more—10 cents per month in this bracket, the total would amount to $18,000,000 a year. And that would be mostly net, because it would require no addition to plant or service. All it would require would be the selling of the *use* of the existing installation and equipment.

However, my feeling is that we have another important thing to consider if we are going to build soundly for the future; if we are really going to develop the full potential value there is today and for tomorrow among the unsold, the low-use, the low-income group of customers.

It is not new. It started fifteen years ago and more and more companies are finding its application invaluable. None that I know of would think of giving it up. With one properly trained man representing the company intimately to each group of approximately a thousand customers, you are bound to set up a personal relationship with your consuming public that will build sales for the future and keep your customers sold. Let me cite a few of the things the District Representative Plan has accomplished in one

* Abstract of E.E.I. convention paper.

company. I quote from an article in ELECTRICAL WORLD of May 21 by J. H. Shearer, president and general manager of the Pennsylvania Edison Company, Altoona. I wish I had time to read the whole thing right here and now. I recommend it to you as a bit of case history on the subject of building for the future. Here is a company with annual residential and small commercial billing of one and a quarter million dollars in 1936. The District Representative Plan was put into effect in the early part of that year. By December, 1937, revenue had increased 7½ per cent:

"Bill delinquencies of 30 days dropped from 30 per cent to 8.5 per cent.

"Charge-offs for the year dropped from $11,000 to $3,200.

"Disconnects for non-payment from 431 in April, 1936, to 19 in December, 1937, thirteen of which were reconnected the same week.

"Sales leads turned in jumped from 545 in 1936 to 821 in 1937.

A. W. Higgins, president Florida Power Corporation (at left), receives the National Electric Water Heating Council trophy and a check for $1,000 from council representative A. E. Julian

"Sales resulting from these leads increased from 15.5 per cent to 25.9 per cent."

We know that residential sales are the most important hope we have for the future stability of our industry.

Let me leave with you in closing the following points which are vital if we are to build soundly for the future in residential sales.

1. We must hold our present revenue against load mortality due to progress in the industry.

2. We must find our market for expansion of service among the unsold, the low-use customers of today and the new building developments of tomorrow.

3. We must develop our market with careful attention to the load factors involved lest we find ourselves in the anomalous position of having increased our kilowatt-hour output at a loss in dollars of net due to excessive investment requirements.

4. We must hold our market by selling the use, not just the appliance, by the development of sound public relations built on our own intimate understanding of the public's needs, and the public's appreciation of us.

Customers and Service

Management Technique Involves Broad Co-ordination of Efforts From Operating Practices to Attitude of Employees in Rendering Proper Service to Customers

By W. H. HARRISON*
Vice-President American Telephone & Telegraph Company

BROADLY speaking, service, good or bad, is the product of instrumentalities and of the organized effort and will of the personnel. One must complement the other. This is desirable in any business, but is essential in ours.

Of course, good communication service would be impossible without adequate instrumentalities, and notwithstanding the really fantastic advances in ease of conversation, clarity of transmission, greater reliability, freedom of interruption, flexibility for ready expansion, the conquest of distance, all the result of intensive and continuing search for new and improved instrumentalities, it is not my purpose to discuss the influence of these on present-day service.

In this age of scientific achievement the art of management technique, of management's power to inspire, to develop and assign responsibilities, to analyze and appraise results and causes, to interpret aims and policies, to bring out the best in men and women, frequently is not recognized as having the force it does have in rendering adequate service.

In fact, the greatest asset in our present-day service is the years of patient constructive effort that have made service ideals—traditions—part of the habit of thinking of the entire organization. Manifestation of this tradition is found in every activity—it underlies every consideration of the business. You need no reminder of the tremendous force of this.

This management technique and responsibility involves the co-ordination of a wide range of activities reaching all the way from specific operating practices to the attitude of mind of the people doing the work. It takes form in methods, procedures, in knowledge of the essential facts as to performance, appraisal of results from the user's standpoint, training and continuing development of the personnel in every level of the organization, satisfactory and considerate conditions of employment, sound employee relations. It is this broad aspect of service that I think will be of most interest.

Service betterments flow as fre-

* Abstract of E.E.I. convention paper.

quently from advances in methods as they do from advances in instrumentalities. For example, one of the most impressive and attractive features from the customers' standpoint within the past decade grew out of the development of the operating method whereby a long-distance call is handled while the customer remains at the telephone. Before the introduction of this method the average time required to handle a call was six to seven minutes, whereas the average is now 1.5 minutes.

With service the function of so many inter-related activities it is hazardous to suggest that any aspect is most important, but in our business there is general agreement that without full and continuing knowledge of the essential facts regarding just what the customer receives—experiences in using the service—management would be without its most useful tool.

Results data for tools

Over the years, step by step, within the Bell System there have been developed tools which make available to supervision on a current and programmed basis significant and dependable facts as to just what standards of service are maintained. These tools take form in periodic results data procured on a sampling basis, and for the most part by specially selected employees not engaged in the work under scrutiny.

The sampling procedures cover all day-to-day operations. They are designed to include substantially every type of contact between the customer and the company.

The information, in a form available for ready use and on a current basis, is furnished to the supervisory forces for such action as may be necessary or desirable. No supervisor is without pertinent facts as to the work under his or her direction.

Let me illustrate:

A customer makes a request for new service—for change in service. Management should know:

1. Is all the essential information—name—street address—etc., correctly recorded?
2. Does the customer understand charges—initial and recurring?
3. Does customer understand full uses of service?
4. Does customer have adequate services?
5. When is completion of work desired?
6. Was work done when and as requested and in manner desired?

Another operation will further illustrate: A customer wishes to make a call from a manual switchboard or from a dial office. Here are the things that should be known about these calls:

1. What was the time interval in seconds required to establish the connection.?
2. Was any difficulty experienced?
3. What were the transmission characteristics?
4. Was the manner of the employee involved satisfactory?
5. How many calls failed of completion because the called party's line was busy—no answer—slow answer—faulty operation—or for other reasons?

Another type of operation. A customer makes some inquiry as to his bill:

1. Was the information furnished correct in every detail?
2. Was the manner of the employee satisfactory?
3. Was the customer fully satisfied with the explanation?
4. If the inquiry could not be immediately answered, was the information given within the promised time?
5. Was there any unnecessary delay in the handling of the inquiry?

The separate operations under scrutiny and the specific data recorded are far too numerous to outline here. I think, though, that the above illustrations give you some idea of the general plan.

When it is considered that there are 85,000,000 telephone calls made each day, 400,000 contacts in our business offices each day and 90,000 visits to a customer's home or office for installations or repair work, faulty or imperfect handling of even a fraction of one per cent of these contacts holds potentialities of customer irritation or ill-will in hundreds of thousands of situations each day.

The broad pattern of all of these results data is such as to make possible intensive and healthy competition between separate units of the system, thus providing one of the greatest of stimulants for progressive improvement—spirit of competition. Much of the data is reduced to a common denominator to make comparisons equitable, and particularly to make trends significant. This procedure has the further value of bringing to bear the combined experience of all units of the system in the search for better results.

For the most part I have been referring to transactions readily susceptible of measurement; in short, to the technical phase of service. But good technical service is not enough. Service must be pleasing, the customer must be made to feel that there is personal attention for him. This important requirement is difficult to define. It is found in the tone of voice, in expression in the eye, in manner of speech, cordiality of mind; in short, it is that something way down deep in people which moves them instinctively to do graciously those things they are called upon to do; it is what we sometimes speak of as the tone of service, the frosting on the cake, the desire to please, service from the customer's viewpoint; it is the "voice with a smile."

All of this is especially important when a customer experiences difficulty or in unusual circumstances. It manifests its presence in every conceivable fashion, and frequently takes the form of running counter to established practices to care for an immediate situation.

Results here—good or mediocre—are about in proportion to the employee's interest in the job, and this reflects the ability of supervision to inspire, enthuse, create and sustain team play—maintain idealism. It has as its foundation satisfactory conditions of employment, considerate treatment, continued sympathetic understanding and mutual respect between employees and management. I happen to think that in any business these days there is no more important management responsibility than this. Certainly it is fundamental to good service.

W. H. Harrison

Building Sales and Jobs in Lincoln, Neb.

Nash-Kelvinator's Plan of Creating More Jobs by Creating More Sales Sweeps City Like a Prairie Fire

By H. W. BURRITT *
Vice-President
Nash-Kelvinator Corporation
Detroit, Mich.

SEVERAL months ago our sales promotion department was planning our June-July sales campaign. We know, as you know, that every appliance which your great industry has pioneered—flatirons, vacuum cleaners, washing machines, electric refrigerators and all the rest—have built their success on the principle of specialty selling—of going out from behind the counter and into the home—and asking people to buy.

Soon our thinking began to run along these lines:

First—Unemployment is a major national problem.

Second—Though undoubtedly impaired, the ability to buy is still to be found among our citizens. Though millions are unemployed many other millions are at work.

Third—The first step toward the reemployment of the unemployed is the sale in increased quantities of our farm and factory products to those who *are* at work.

Fourth—The American salesman faces a remarkable opportunity to be of help in the solving of the unemployment problem.

Today the national need for his services is greater than ever before.

The fifth point is—That the business of any manufacturer or any industry will be helped by the success of other manufacturers or other industries.

Proof needed

But first of all we needed proof that these truths about hard work and fundamentals were as workable as ever. We chose Lincoln, Neb., as a typical American city for our proving ground.

On the morning of May 11 two of our own men and two men from our advertising agency slipped into Lincoln without any advance notice. Their selling plan was a very simple one, but they had realized that the idea of working hard isn't very inspiring to any one. So their program for making hard work interesting and attractive was thorough and complete.

Wednesday, May 18—Early morning sales meetings in all the larger stores. Newspaper stories on the first page now! Our Nash-Kelvinator party arrived to find a city gay with flags. Crusade cards in every window.

Crusade buttons everywhere. On salespeople in the stores—on newsboys—popcorn vendors — and on "brass-hattish" looking men who might be bosses just coming to work.

Our distributor in Lincoln held a breakfast. His dealer organizations, Chamber of Commerce officials, utility representatives, the Mayor of Lincoln, the Governor of Nebraska—and our distributor's competitors were there.

At this breakfast the National Salesmen's Crusade was explained. Governor Cochran gave a ringing keynote address. Dealers and salesmen signed their pledges and the Crusade was under way. Out-of-town dealers hurried home and Lincoln salesmen went to work.

The idea had swept across the city like a prairie fire. One woman phoned that she had heard a broadcast about the Crusade and felt it her duty to buy something. Would the department store send out a salesman? It did and she bought a refrigerator.

A newsboy, the Governor's son, by the way, canvassed his route and got eight new subscribers. Coldspot sales were up 50 per cent, we are told, during the first week. Sears tractor sales spurted and the Lincoln manager wired his home office suggesting a national tie-in. One of our executives asked a policeman where he could sell a refrigerator. The officer gave the name of a fireman at a nearby station. No, he wasn't in the market, but he would be glad to round up all the other members of the company to listen to a sales talk. A woman who bought on Thursday brought a neighbor down on Friday and stood by until another sale had been made. A motor car dealer increased his sales 300 per cent over the week before. A department store reported that the first 433 calls yielded 98 prospects and 42 sales. One sale to every 10 3/10 calls. Our own organization is selling one refrigerator, range or washing machine to every 10 and a fraction calls.

May sweep country

It seems more than possible that we are on the eve of one of those great, and sometimes unexplainable, movements that have from time to time swept across the nation with irresistible force. For you and for us in the appliance industry there are two things to remember.

First—The day of specialty selling has not passed. Hard work will still make sales. Salesmen used to say, "Ten calls—one sale." Then they changed this to, "No sales—no matter how many calls." And out in Lincoln today the average salesman is getting his one sale from just a fraction more than the old ten calls! And they will keep on doing it, for the Crusade is not a drive of a week or a month. It's a continuous hard work program, inspired on both the buying and the selling end by an understanding that more sales mean more jobs.

Second—And this is important—every business profits by the success of every other business.

Stones for David's Sling

Five Stones Suggested to Management to Meet Three Current Obstacles Confronting Business

By H. S. METCALFE*

Director of Public Relations
West Penn Power Company, Pittsburgh

FIVE pebbles to slay Goliath! Of course, it's a familiar story. The red-haired shepherd lad, potential deliverer of his people, faced the mighty spokesmen of the Philistines. After hearing the bragging threats, David accepted the challenge, calmly picked out five smooth stones from a nearby brook and, with deliberate aim, used his sling to lay his adversary low. With the downfall of Goliath, the hopes of those he represented also died.

Goliath is a symbol of the adverse ideas of his particular group; David, and his five stones with which he successfully overcame the adversaries of his people, is a symbol of an obstacle remover. It was a case of overcoming one set of ideas with another.

American business in general, and our industry in particular, likewise faces obstacles. There are three Philistine conditions which confront business—unfriendly attitudes, the new era of questioning, and the tyranny of words.

There are five stones for David's sling which can meet and overcome these conditions. They are—friendliness, logic, and three kinds of facts—facts about our industry, facts about what people think, and facts about economics.

We recognize that, in addition to constantly improved service at lower rates, excellent work is being done to promote understanding through public contact programs and employee education. Current examples are the Pennsylvania Edison Company's District Representative Plan, ably presented by J. H. Shearer in a recent issue of ELECTRICAL WORLD, and the sound slide films on constructive customer relations just issued by the Vocafilm Corporation, with co-operation of the Edison Electric Institute.

There is, however, one phase of the public relations approach which, if not already so placed, can best be delegated to the advertising executives: *i.e.*, the publicity sector of public relations. It is my personal belief that a better public relations job can be done by utility companies if the publicity director and advertising manager are the same man. He needs to be the control officer in the firing of our David's stones of friendliness, facts and logic, so far as the published, printed word is concerned. This responsibility can only be delegated in this manner, however, when the advertising executive is of such caliber as to be sensible of the obligations and opportunities such an assignment includes.

A suggestion to management

Why tie in the publicity sector of public relations activities with the responsibilities of the advertising executive?

1. Because the advertising man already has close contacts with publicity media. He can serve both as an interpreter of company news as well as a buyer of space. This dual relationship with newspapers may be largely a matter of better personal acquaintance with their owners, editors and reporters. It affords an opportunity for more frequent informal contacts in which the utility advertising man has an opportunity, on or off the record, to present the company's viewpoint on matters of public interest.

2. Every bit of advertising done by the company can be checked as to language and statement against the company's public relations policies, to serve the purpose of establishing a friendly, human understanding.

3. Many of the commercial advertisements can be developed to contain a definite public relations component, such as "Electricity is the cheapest thing you buy," "Industries grow, where power rates are low," "It pays to live better electrically," "Only one shut-off in eighteen months," "See your electrical dealer," "Operating cost lowest in state."

4. When institutional advertising and publicity articles are released the advertising executive has a unique opportunity to weigh the effect of company policies on public attitudes.

5. The advertising manager should be in the best position of any one in the company to know what size advertisements, what kind of copy, what sort of headlines are the most effective in putting across specific messages and to see and utilize opportunities for impressing facts about the company's policies favorably upon the public.

6. An appraisal of editorial attitudes and public attitudes is possible through a reading and analysis of incoming publicity printed by the newspapers within the company's territory. Such an appraisal is of vital value to management.

Doors that should be open

To secure the fullest values from such an operation, definite responsibilities rest upon management. What are they?

1. It is of the utmost importance for the advertising and publicity executive to be familiar with all the public relations problems of his company. He should be given entrée to all internal management affairs which will enable him to keep the company's broad picture clearly before him.

2. He should be free to advise management with respect to the public interest in individual company policies as revealed by his analysis of public opinion.

3. He needs to secure first hand the viewpoints expressed at sales committee conferences, manufacturers' product and promotion presentations and similar group meetings.

4. He should be acquainted with and exchange ideas with men holding similar positions in other companies.

5. He should attend conferences such as this not sporadically, but regularly, to familiarize him thoroughly with the general problems facing the industry.

6. He should be given the opportunity to take an active part in the industry's committee activities, particularly those with which face the problem of promotion and sales in all fields.

* Abstract of E. E. I. convention paper.

Deflecting the Curve of Rising Accounting Costs

Practices in Plant Accounting Construction Overheads, Stores and Transportation and Consumer Records Should Be Analyzed for Savings

By B. S. RODEY, Jr.*
Associate Controller Consolidated Edison Company of New York, Inc.

I HAVE promised to point out a number of possible accounting economies. Before doing so, let me, however, confess that I am not at all sure that any of us know today exactly just what an economy means. Elimination of work in one direction may in fact result in increased strain or loss of valuable information elsewhere. More often than not, a so-called economy is more apparent than real. However, there exist undoubtedly substantial possibilities for improvement, and my suggestions can only scratch the surface as to the opportunities available through adequate research and study.

A simpler treatment of our present plant accounting would be, in my estimation, the first and foremost of possible economies. The pendulum here has swung so far that one might think we have carried accounting for construction costs, inventory, retirements and depreciation matters to a point where accounting seems to become an end in itself.

What we call the "dollar follows the property theory" has possessed the minds of many accountants and engineers to such an extent that hardly any material change can be made in the physical plant without a corresponding authorization and debits and credits to plant investment accounts. This is done, of course, to maintain net plant costs corresponding to existing plant facilities.

Suppose "theory" should swing in the other direction and no changes in the physical plant in the nature of substitutions, replacements and reconstructions of existing facilities were handled through the investment account, what would be the result? A very substantial saving in con-

struction and plant accounting expense. We can't even be sure at this time that any real loss would occur in necessary accounting or original cost rate base information. In fact, the result might be nearer to a correct "investment accounting" basis, so far as an automatic rate base is concerned. The new accounting regulations are opposed to such a method, however, and any such saving will require research, proof and a great deal of effort. Is it worth while?

It would seem possible that a saving to the industry of several million dollars a year might be accomplished if the plant accounting requirements could be reduced to their bare essentials, such as a reasonable sub-segregation of investment costs of particular plants, locations and areas. Should the commissions consent to such a step, we might effect still more important savings by obtaining agreements establishing depreciation and maintenance reserves on a fair overall percentage of investment, to be adjusted periodically as experience might require.

Test department example

The processes now frequently used in the apportionment of so-called construction overheads present considerable possibilities of accounting economies. Let us look, for example, at the accounting for the costs of a testing department. One way consists in determining the costs for each and every testing job, having the men put down the time spent on such job, and accounting at the same time for materials used or expenses incurred.

What cannot be directly allocated, such as management and supervision, is charged to the various jobs as indirect cost or overhead. On the other hand, we might take the same department and charge all of its costs to one clearing account, compute what the testing cost would be per man-hour and then, on the basis of the number of hours directly reported on a given job, allocate such costs to the various accounts. Obviously, the latter method is less costly than the former. You may, of course, object that it results in charging a man whose earnings are 75 cents per hour, for example, to an account on the basis of $2 per hour. The method involves, however, a flat determination of the cost of a man-hour of testing, including all departmental costs. This is the way your plumber would bill you if he were doing a job on your house.

Small Deliveries—All companies

* Abstract of E.E.I. convention paper.

are confronted with the accounting problem pertaining to small deliveries of materials made by their transportation departments.

To facilitate the accounting distribution of these costs, consideration should be given to their collective treatment, in preference to the separate accounting for each item of delivery cost. This can be accomplished by the use of an average hourly rate on the basis of the truck-hours of service rendered to the respective departments.

One average rate can be used for all trucks, since availability rather than the size of the load may be the determining factor in assigning a truck for a given service.

Handling Salvage Credits When Removing and Resetting Electric Meters—In connection with removing and resetting electric meters it is decidedly impractical to identify the small materials returned to the stores department with each installation.

A practical solution of this accounting problem would be to accumulate this material in the storeroom, segregating the usable portions from the various kinds of junk, and periodically issuing a summary credit ticket.

This credit may be applied to the removing and resetting meters account, instead of attempting to identify the credit of the material with each individual location from which the material was removed.

Machine accounting offers substantial possibilities, although the determination of actual savings frequently requires an intricate weighing of the advantages to be gained against disadvantages in other directions. At one time, some years ago, machine accounting was put forward as the cure to all evils. While one cannot successfully deny the usefulness of machines in certain phases of accounting, the adoption of machines in place of manual labor should be very carefully considered with regard to all the attending circumstances before jumping to conclusions. There is the human element to be kept in mind. Take the case of a customer who calls up, insisting that his bills have averaged too much for the past few months and demanding an adjustment. If you are not able to ascertain quickly all relevant information, the effect may be such a loss in good will that any savings in accounting may, in the long run, be more than offset.

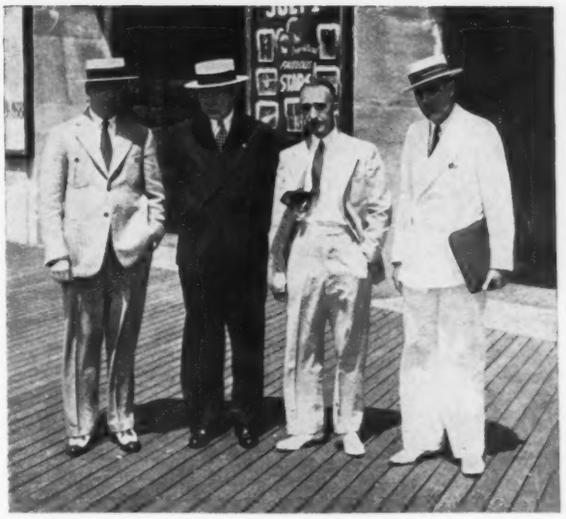
I believe that a reduction in the number of consumers' deposits will in most instances effect substantial economies.

At the Detroit accounting conference Mr. Ulbricht had a very good paper regarding the use of a recording film, whereby a large volume of records may be preserved in a small container which you can cover up in the palm of your hand.

Duplication in the rendering of routine reports, particularly to parties not essentially interested, requires continuous scrutiny of such reports, the number distributed and the persons receiving them.

Co-ordinating the closing accounting periods with executive meetings to eliminate overtime and arranging for the early "cutting off" of labor reports, material reports, etc., in order to effect prompt closing, as well as the statistical treatment of split-week payrolls in connection with the accounting for labor costs, have frequently resulted in substantial savings.

I close with the thought that you return home with the firm resolve to better the status of your accounting people, giving due recognition to their outstanding importance in the economic management of the modern utility business.



Walter H. Sammis, vice-president Commonwealth & Southern Corporation, New York; Dan E. Karn, vice-president Consumers Power Company, Jackson, Mich.; D. E. Gallagher, Consumers Power Company, winner of the Thomas W. Martin Award, and Harry Curtis, Tennessee Electric Power Company, winner of the Augustus D. Curtis Award

Fluorescence Adds Color to Lighting

FLUORESCENT lumiline lamps having no metal filaments are the newest development in lighting demonstrated at the convention by Ward Harrison, director of engineering, Incandescent Lamp Department, General Electric Company. Mercury vapor is used as the light source. Illuminating engineers have long recognized the mercury-vapor lamp such as has been used in photographic studios as more efficient than the filament lamp, Mr. Harrison said, but because of its characteristic blue light, it has been undesirable for general illumination.

In the new lamps recently developed this previous difficulty has been overcome by coating the inner side of the tube with fluorescent powder. By using powders of different ingredients it has been possible to produce more efficient white lights as well as colored lights in a variety of beautiful and interesting shades. The shades which have been produced include red, gold, pink, blue and green, as well as white and daylight.

Uses predicted by Mr. Harrison for the new lamps are in the field of decorative lighting, including advertising purposes, for store and industrial lighting, and for home lighting. They are adapted for use in many situations where daylight conditions are desired. They may be used in coves, exposed lines, niches and fixtures. Many additional uses are anticipated as the lamps come to the attention of architects, decorators and builders.

More complete data on latest developments in the art of fluorescent lighting will be found in ELECTRICAL WORLD, *May 7, 1938, page 56.*

Direction of Utilities' Present-Day Growth

Analysis of Prices, Volumes, Costs and Competitive Influences Provides Basic Data for Most Effective Load Building

By HARRY A. SNOW *

Comptroller The Detroit Edison Company, Detroit, Mich.

IN THE last two decades from 1917 to 1937 the electrical energy generated by the utilities of the United States as reported by the Edison Electric Institute has grown from 25,438,303,272 kw.-hr. per year to 115,165,636,000 kw.-hr., or more than fourfold. In 1937 three main classes of electric service took 91.0 per cent of the total output—residential service 19.4 per cent, commercial service 17.6 per cent and industrial service 54.0 per cent. The small remainder is principally required for street lighting and traction.

Residential service (including farms) has had the most rapid growth, increasing from sales estimated at 1,600,000,000 kw.-hr. in 1917 to 19,264,793,000 in 1937. The increase in the two decades has been twelvefold. The increase in the two other main classes of service has been only a third of the increase in residential service. Commercial service increased from 3,950,000,000 kw.-hr. in 1917 to 17,557,951,000 in 1937, a little more than fourfold. Industrial service increased from 14,450,000,000 kw.-hr. in 1917 to 53,546,370,000 in 1937, an increase of almost fourfold. In the two decades residential sales have increased twelvefold, while commercial and industrial sales have only increased fourfold.

Residential service

The increase in sales to residence customers has come from (1) an increase in the number of customers and (2) an increase in the consumption per customer.

In 1917 there were 5,810,300 residence customers in the United States, and in 1937 22,939,020. Meantime the population of continental United States increased from 102,172,845 to 129,257,000 people. Thus in 1917 one family in four was receiving electric service; in 1937 three families in four. There is not much room left for growth by extending service to more families. In cities and villages electric service is already universally available and almost universally used; in the farming areas 28.7 per cent of the farms with dwellings valued at more than $500 and 19.3 per cent of all occupied farms are receiving electric service. Sales will be increased somewhat by the continuing extension of farm lines, but net earnings cannot be increased thereby unless suitably high rates are charged, because the farm territory that provides only three or four customers per mile of distribution line requires the investment of $300 or $400 per customer for line, transformer, service and meter alone. With immigration restricted, the growth of population will not be spectacular and the extension of lines to homes now unserved can produce no more than a 10 or 15 per cent increment.

If manufactured gas costs 80 cents a thousand, the equivalent price of electricity is: Range, 2.1 cents per kilowatt-hour; refrigerator, 5.6 cents per kilowatt-hour; water heater, 0.9 cents per kilowatt-hour.

It appears that, purely from a cost standpoint, gas competition for water heating is so effective that only off-peak storage heaters can make headway, that electricity may well be as cheap as gas for ranges and that it is cheaper for refrigeration. The advantages of quality of service, collateral costs, etc., possessed by electricity are not discussed here.

Annual load factor has improved. In 1917 sales in the two lowest months of the year, July and August, were less than half (46.7 per cent) of the sales in the two highest months, December and January. In 1937 sales in the two lowest months were more than three-quarters (75.4 per cent) of the sales of the highest months.

Residence load is steady through booms and depression. Sales of residential energy in 1932 and 1933, the two worst years of the depression, were larger than in 1929. More recently Detroit Edison sales of residential energy in April of 1938, the sixth month of the recession, were 15.2 per cent larger than in April of 1937. Depressions have little effect on residential sales.

The distribution system is spreading out because the automobile, with its concrete highways, has so improved transportation that the crowded city districts of the '90s with their tenements are giving place to far-flung suburban communities with garage houses and a motor car. Accompanying this migration to the suburbs has been the extension of farm lines in the rural areas. The distribution system of 1937 is a more costly affair than it was in 1917. Twenty years ago the Detroit Edison Company required only 50 poles to reach 100 customers; in 1937 it required 77 poles. Similarly, in 1917 one line transformer served 30 customers, while in 1937 one line transformer served only nine custom-

* Abstract of E. E. I. convention paper.

ers. We must nowadays provide more poles, more wire and more line transformers to reach 100 customers than we did twenty years ago.

Commercial service

"Commercial service" is here defined as all of the service between the residential customer on the one hand and the large industrial plant taking primary service in blocks of 100 kw. or more on the other. It is entirely at secondary voltage. The class includes stores, offices, garages, theaters, restaurants, small industrial plants, etc. It is predominantly commercial, but includes of necessity the smaller industrial uses. The fourfold growth in commercial service in the two decades is not as spectacular as the growth in residential service and does not hold as much promise for the future.

Industrial service

Suppose we define "Industrial Service" as service rendered at primary voltage to customers desiring energy in blocks of not less than 100 kw. It is not purely industrial; analysis shows that in Detroit 84 per cent is used for industrial purposes and the remainder for commercial purposes. However, the class is predominantly industrial and will be so named.

In Detroit the use of industrial power per industrial worker has increased from 4,000 kw.-hr. in 1920 to 11,000 kw.-hr. in 1937. Assuming that the industrial worker in 1920 worked 2,400 hours per year, he had to aid him the power of two horses. The industrial worker in 1937, working only 2,000 hours per year, had to aid him the power of seven horses.

Industrial power is subject to direct competition. The industrial customer is large enough to build and operate his own steam power plant. In this he has the advantage that he need not build an extensive transmission and distribution system, and that to the extent that he has use for exhaust steam he can generate electricity for 4,000 or 5,000 B.t.u.'s per kilowatt-hour. He must risk the capital to build his power plant, he must provide spare equipment for standby service and he must forego the advantages possessed by the utility of the high load factor produced by diverse uses and probably of an ample supply of condensing water. For power supply up to 1,000 kw. Diesel engines must be considered competitors. Diesel power plants may cost from $120 to $150 per kilowatt of nameplate rating, they will generate 10 or 12 kw.-hr. per gallon of fuel oil and the additional cost of station labor, supplies (excluding fuel oil but including lubricating oil) and maintenance may run from 3 mills to 6 mills per kilowatt-hour.

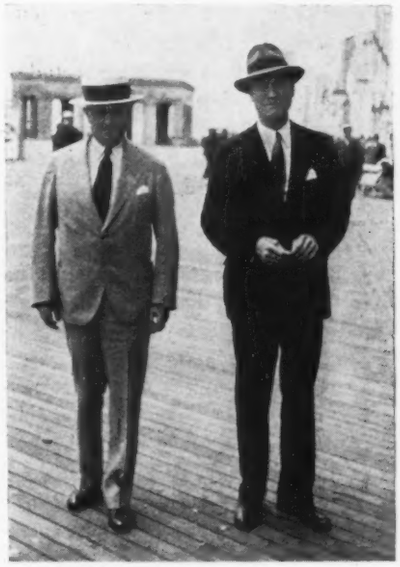
As to the boom and depression load factor, industrial service is the temperamental prima donna of the electric industry. During the depression industrial sales dropped from 42,970,860,000 kw.-hr. in 1929 to 30,964,471,000 kw.-hr. in 1932, nearly 28 per cent. Detroit Edison industrial sales for April, 1938, fell off 46 per cent from industrial sales for April, 1937. Industrial sales are exceedingly prompt in their response to the ebb and flow of the economic tides.

We are told by TVA that they are teaching privately owned utilities the advantages of low rates as a stimulus for output. TVA goes farther than this. They state that greater sales produce lower unit costs so that profits are actually increased by lower rates. No study of future load growth would be complete without a discussion of these proposals.

Let us examine the first statement, namely, that lower rates bring increased sales. In the two decades 1917 to 1937 the Detroit Edison Company has made sixteen major changes (we will ignore minor changes) in the rates charged for the three classes of service, residential, commercial and industrial. Four of the changes were increases in rates made necessary by a short period of very high costs just after the Great War and twelve were decreases. Counting three classes of service for twenty years gives us sixty opportunities to observe the growth of sales, in sixteen cases after major rate changes.

On the four occasions when rates were increased we observe, for the year following the year in which rates were increased, two increases in the volume of energy sold and two decreases. On the twelve occasions when rates were decreased we observe, for the year following the year in which rates were decreased, ten increases in sales and two decreases. Thus we find 5.0 times as many increases in sales after rate reductions as there were decreases. This would seem to indicate that increased sales are more likely to follow rate reductions than are decreased sales by five chances to one. But let us observe the 44 occasions when rates were neither increased nor decreased during the preceding year. Of the 44 observations there were 37 increases in sales and seven decreases in sales, which is a ratio of 5.3 to 1. Thus an increase in sales appeared a little less frequently after a decrease in rates than it did when rates remained unchanged. And so we may say from 60 observations of the three major classes of electric service over twenty years of experience that increased volume is no more likely to occur after a decrease in rates than when no change in rates has been made. The price of electricity is a minor factor, not a controlling one, in determining the volume of electricity sold.

We have answered the proposal that lowered rates will themselves lower costs and increase profits; we now challenge the federal government to answer our counter-proposal that the way to lower prices for electricity is through the cessation of governmental boosting of financing, labor, coal and accounting costs and by a reduction, instead, of an increase in the heavy taxes which it now imposes. These statements are made dispassionately and without rancor. They are made, not to fight our government, but because our government needs to be informed of quantitative truths.



Col. William Kelley, president Buffalo, Niagara & Eastern Power Corporation, and Alfred H. Schoellkopf, president Niagara Hudson Power Corporation

Power Sales and Profits

Diminishing Net Operating Income of Utilities Focuses Attention on Need for More Critical Appraisal of Power Loads

By WALTER H. SAMMIS
Vice-President Commonwealth & Southern Corporation, New York

A STUDY of the remarkable growth of the electric utility industry reveals some serious problems. Increases in gross revenues no longer bring corresponding increases in net income and the earning power of invested capital is showing a steady decline, due largely to increased taxes, wages and other costs. For the year 1937 the electric light and power companies, as reported by the Edison Electric Institute, received gross revenues of $2,055,000,000. This produced an operating income (after depreciation but before interest payments) of $727,000,000. So far this year the companies, as reported by Moody's Manual, have shown a decrease in operating income of about 10 per cent, indicating for the year 1938 as a whole an operating income of about $654,000,000. The U. S. Census of 1927 shows for that year an operating income from electric operations of $645,668,531. Operating income of the electric light and power industry is thus practically back where it was eleven years ago, although in the meantime between four and five billion dollars has been invested in additional plant and equipment.

Sales to commercial and industrial customers in 1937 accounted for 72 per cent of the total kilowatt-hour sales and 56 per cent of the total revenue of the electric utilities, or approximately one and one-quarter billions of dollars per year. This amount of business deserves and requires very close attention, particularly when we realize that it is largely competitive.

The matter of selling power is becoming more and more specialized. Going back again to the early '20s, if the power salesman had a good engineering background, a little knowledge of steam engine generator plants and was a fairly good mixer he got along pretty well. Today, however, conditions are entirely different and our sales organization must be diversified. It must include well-qualified power salesmen with a broad outlook, who know and can evaluate the many collateral advantages of purchased power and can recognize the specific applications for electrification in the various industries served. This type of man, however, must have the assistance of the engineers who are specialists in the details of the involved high-pressure, high-temperature bleeder type turbine plant, which is our competition with the large customers.

With conditions as they are today, in that it is difficult to obtain junior money for expansion, a most important factor, in my opinion, is what might be called selective selling. By selective selling is meant selling that load which is most profitable to the utility. Successful selective selling does not mean restricting sales effort, but rather placing the emphasis on those applications which mean the most net revenue. In power sales this can be brought about by concentrating on sales that improve the system load factor or make use of the utility's existing facilities to the greatest extent. The first step in such a program is the careful analysis of load conditions, not only for the system as a whole but also for the various areas and circuits. The next step is a thorough survey of the potential uses of electricity of each power customer. These two studies will serve as a basis for the establishment of sales plans and programs which will place the emphasis on the particular types or locations of potential loads which the company can most economically add and will thus produce the greatest net revenue per dollar of investment.

In conclusion, I would like to leave with you a few thoughts:

First—No industry is completely electrified.

Second—Rates must be such that they will obtain the bulk of the business, but at the same time protect the company in these times of rapidly changing and fluctuating business conditions and costs.

Third—A properly balanced selling organization is necessary.

Fourth—Energetically seek that business which makes use of the utility's existing facilities to the greatest extent.

And Finally—Even though our industrial sales are slipping, now is no time to relax selling efforts, when competition is so keen and when we have so many opportunities to electrify operations never before electrified, for the reason that business men are more receptive to money-saving plans today than they would be if business was booming.

• Extract of E.E.I. convention paper.

Applied Data Betters Distribution Performance

By HAROLD E. DEARDORFF

Technical Engineer Dayton Power & Light Company, Dayton, Ohio

STEADILY increasing loads on 4-kv. distribution systems have brought to the foreground the necessity for carefully studying the possibilities of effecting greater economics in operation. In addition, the increasing use of motor-driven appliances by residential and commercial customers has steadily reduced the power factor of the load to a point where, in many cases, primary feeders and substation transformers have been unduly burdened with reactive power. As a result, useful capacity is limited, losses are excessive and voltage regulation problems are magnified.

In order to correct this condition there have been developed by the electrical industry various types of equipment which are proving quite effective in their application, namely, static capacitors, step-voltage regulators, transformers with load ratio control, unit substations or their equivalent, and the primary network system.

To apply these various means to a specific problem intelligently it is necessary to gather sufficient field data, organize these data into workable forms with preparation of charts, tables, diagrams, etc., and then to interpret and evaluate this information on an economic basis.

The first step in collecting data is to obtain 24-hour load curves for each feeder in question. This information should include both the kw. loading and the power factor and can be obtained from hourly station log readings of volts, amperes and kilowatts, where these are available and of reasonable accuracy. In many cases all of these quantities are not available and in unattended substations would require a multitude of graphic records to furnish this information. In addition, considerable detailed work is necessary in order to calculate the hourly kva. and kvar., which is required for later use.

A very simple method of readily procuring this information is available in the form of a graphic wattmeter with an attachment which periodically records (Fig. 1) the kvar. of the circuit.

The 24-hour load data should be obtained for both maximum and minimum load days, which in most cases will be Monday or Tuesday for the former and Sunday for the latter.

In addition to these load data there should be available the electrical constants of each feeder, such as the resistance and reactance of each component part, together with the distribution of the installed transformer capacity over the feeder.

After obtaining the graphic kw.-kvar. chart for a particular feeder or suitable equivalent instrument readings it is advantageous to prepare a single 24-hour graph (Fig. 2) showing the kva., kw., kvar. and power factor for both the maximum and minimum load days.

A skeleton feeder map (Fig. 3) should next be prepared, showing the main feeder and important branches. On this map should be shown, for each section, the length, type of conductor and spacing, the average maximum kva. and its power factor and the minimum kva. and its power factor. The maximum and minimum kva. allocated to each feeder section

McGRAW PRIZE PAPER

Mr. Deardorff's paper, with the title "The Gathering and Evaluation of Data for Improving 4-Kv. Distribution System Operation," was awarded one of the James H. McGraw Prizes for "the three most meritorious papers on any engineering or technical subject relating to the electric light and power industry."

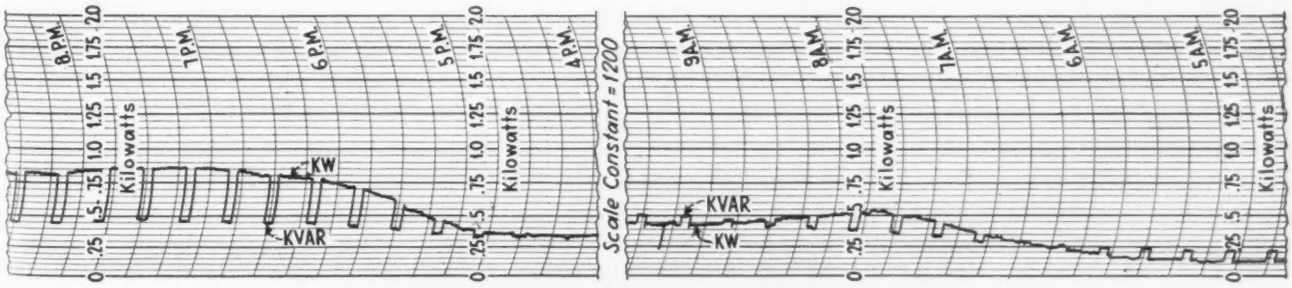


Fig. 1—Typical Monday as 4 kv. sees it

The wattmeter is connected into the secondary circuits of the instrument transformers in the ordinary manner, except that the potential circuit is broken to permit the interposition of an auto-transformer. The latter is arranged to supply the wattmeter with either standard wattmeter potential or quadrature potential for recording kvar. A small synchronous timer, energized from the main potential transformer, periodically energizes a contactor which switches the potential leads of the wattmeter from the standard connection to the kilovar connection on the auto-transformer. By adjusting the timer for a kw. record of fifteen minutes and a kvar. record of five minutes a very complete picture of the feeder load is obtained at a minimum of trouble. Scale constant 1,200

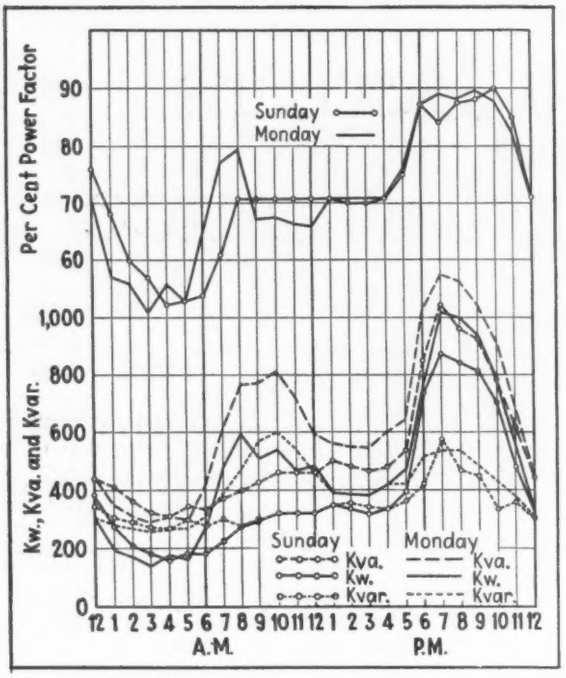


Fig. 3—Skeleton feeder map aids graduated analysis

can be fairly equitably determined by prorating the maximum and minimum loads, as indicated by the 24-hour graph on the basis of installed transformer capacity. In making this distribution due consideration should be given to special loads, which, from knowledge possessed by the engineer, should be given only the weight due them.

For the purpose of determining the voltage regulation in any feeder section use can be made of the principle that the voltage drop is equal to the sum of the projections of the *IR* and *IX* drops on the vector of the sending voltage. For all practical purposes it is immaterial whether the sending or receiving voltage is used, since the angle between them is very small.

This principle can be expressed mathematically as:

$$E = IR \cos \Theta + IX \sin \Theta$$

where E = voltage drop.
I = line current.
R = resistance of line.
X = reactance of line.
Θ = power factor angle.

This equation can be more advantageously used in the following form:

$$E_d = \frac{\text{kva.}\ d\ (R \cos \Theta + X \sin \Theta)}{10\ \text{kv.}^2}$$

where E_d = per cent voltage drop.
kva. = average load of line section.
d = length of line in thousands of feet.
R = resistance per thousand feet.
X = reactance per thousand feet.
kv. = phase to phase voltage of line.
Θ = power factor angle.

From this equation information can be derived for the preparation of a voltage drop chart (Fig. 4).

By means of regulation charts of this type, used in conjunction with the skeleton map showing the feeder circuit constants and loading, the voltage regulation of the various component feeder sections under conditions of maximum and minimum loading can be readily obtained.

The effect of shunt capacitors connected to a distribution line is to neutralize a similar amount of inductive reactive load and to cause a rise in voltage due to the effect of the capacity current being supplied through an inductive line. The latter effect can be mathematically expressed as the product of the capacity current and line reactance, since this voltage will be practically in phase and additive to the line voltage.

$$E = I_c X$$

where E = voltage rise.
I_c = capacity current.
X = line reactance.

This equation can be expressed in a more usable form, as follows:

$$E_r = \frac{C\ \text{kva.}\ X\ d}{10\ \text{kv.}^2}$$

where E_r = per cent voltage rise.
C kva. = kva. of shunt capacitance.
X = line reactance per thousand feet.
d = length of line in thousand feet.
kv. = phase to phase voltage of line.

By means of this equation a table of per cent voltage rise per 1,000 feet per 100 kva. of capacitance load can be prepared for various sizes of conductor and spacing. The table above shows such a compilation for various conductor sizes with spacings of 24 and 48 in. and for a line voltage of 4.1 kv.

Per cent voltage rise per 1,000 ft. per 100 kva. of capacitor load (E = 4.1 kv.)

Conductor No.	Per Cent Rise (24 In. Spacing)	Per Cent Rise (48 In. Spacing)
4/0 HDBC strand	0.0672	0.0762
2/0 HDBC strand	0.0702	0.0797
2 HDBC strand	0.075	0.0845
4 HDBC solid	0.0779	0.0868
6 HDBC solid	0.0803	0.0904

By using a table of this type in conjunction with the skeleton map previously described the voltage rise in any section of the primary feeder for any assumed value of capacitance connected thereto can readily be obtained.

In order to obtain a clear picture of the load density of a particular area supplied by the distribution system it is advantageous to have a map of the section (Fig. 5) ruled off in square sections of any arbitrary dimension, such as 1,000 or 2,000 ft. or parts of a mile. By referring to the 24-hour individual feeder load graphs maximum loading can be obtained and allocated to the various distribution transformers on the various feeders in the cross-hatched area of the map. By adding up the individual transformer loads in any square section the peak load for that particular section can be determined. In an area of similar loading the peaks on the various feeders will be coincident, so that the task of determining the load density at peak is relatively simple. If the feeder loads are quite dissimilar, the task is more difficult as it requires considerable study of the various feeder graphs superimposed upon one another to obtain a peak condition. In general, it will probably be found that the load characteristics in an area of considerable size are quite similar.

Where great disparity exists between different feeders in a given

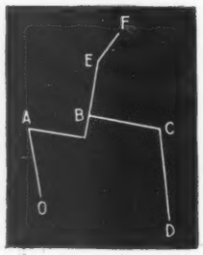


Fig. 2—Evening power factor high on typical 4-kv. feeder

Section	Feeder Data: Length, Ft.	Conductor No. In.	Avg. Kva. Max. Load	Avg. Kva. Min. Load
OA	2,000	4/0@24	1,150@0.89	327@0.52
AB	2,350	2/0@24	1,090@0.89	317@0.52
BC	2,200	2/0@24	590@0.89	170@0.52
CD	2,700	#2 @24	170@0.89	50@0.52
BE	1,800	2/0@24	370@0.89	107@0.52
EF	1,050	2/0@24	160@0.89	46@0.52

Capacitor Data: Location	Kva.
C	225
D	50
E	125

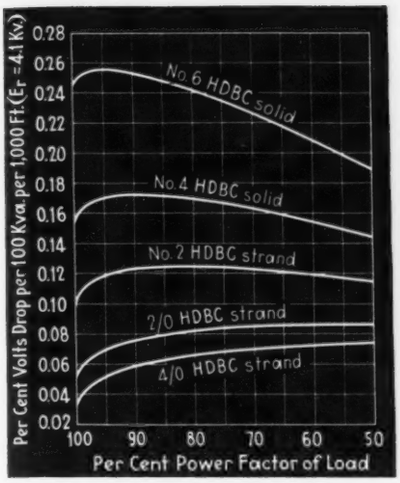


Fig. 4—Voltage drop in 4.1 kv. with 24 in. equivalent spacing

The per cent voltage drop per 100 kva. per 1,000 ft. is plotted against load power factor in per cent as abscissæ. In this manner a curve can be obtained for each conductor size used, and for a particular value of conductor spacing.

area the peak load in each square will have to be obtained by choosing a point on the various feeder graphs involved where a composite peak is reached. In such a case it would be advantageous to construct two load density maps, one showing non-coincidental peaks for the various square sections and another showing the load per section at the time of the composite peak for the entire area.

Evaluation of data

After the various data have been collected and the graphs, maps, tables, etc., have been prepared the task of evaluating and usefully applying this information can be undertaken.

The load density map will prove quite useful in planning immediate changes in the distribution system in that it provides information that will show where and to what extent additional facilities are required, both with respect to distribution feeders and substation and transmission facilities.

In addition, the individual load squares give very important information regarding the amount of load to be later expected in areas undergoing development. These areas will ultimately produce types of loads similar to those already existing in fully developed sections, and thus the letter can be used as criteria in predicting future load growth and planning for system expansion.

If load-density maps are prepared each year the trend of load growth due to greater use of electrical service and to real estate development can be determined. Thus, the effect upon peak demand occasioned by load-building programs, such as range and water heater and better lighting campaigns, can be evaluated. With a knowledge of increased energy use, revenue and the peak demands imposed on the distribution system the load-building activities can be directed more intelligently and emphasis placed where it is most needed.

The load density map is also useful in determining the type of distribution system, from the standpoint of economy and service requirements, that is best suited to supply a given territory. With a knowledge of the load density, the rate of growth, the type of load and general service requirements, and the physical nature of the section, it can be determined what type of distribution system will most economically fill the need. The choice will lie among the 12- or 4-kv. radial systems, the 4-kv. primary network system or the secondary network system or various combinations. The type of construction, whether underground or overhead or a combination of both, will also be determined after proper consideration is given to the various factors involved.

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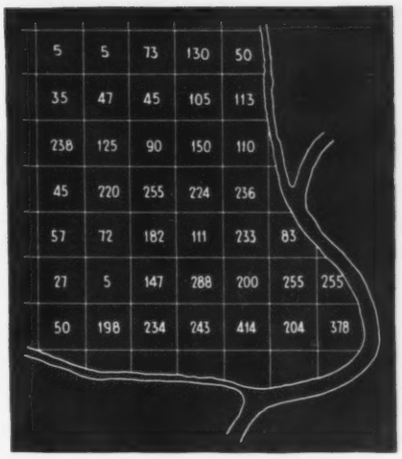

Fig. 5—Typical area supplied by 4-kv. distribution

This map is cross-hatched in sections 2,000 ft. square and shows the load density in kva. at the time of peak. In this particular case the various feeders supplied similar loads and all peaks were practically coincidental.

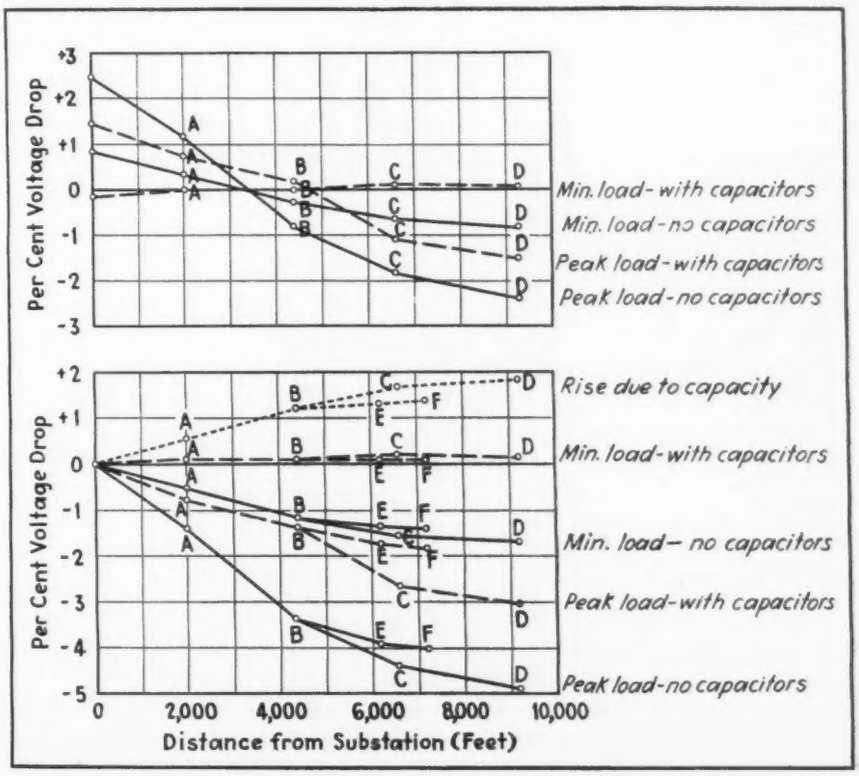

Fig. 6—Range of 4 kv. regulation with and without capacitors

On the lower half of this chart are shown the cumulative regulation of the component parts of the feeder at maximum and minimum loads, the voltage rise due to capacitors installed at locations designated on the skeleton map of Fig. 2 and the resultant regulation after considering the effect of the capacitors. These values are again shown on the upper half of the chart, with the zero point relocated to show how the regulation can be cared for by voltage regulators operating in both the "boost" and "buck" positions. The narrowing of the regulation limits, together with the general voltage improvement along the feeder, after the application of shunt capacitors, is readily apparent.

Editorials

S. B. WILLIAMS, Editor

Analysis the Basis for Future Operations

WHILE lacking in strong emotional appeal, the E.E.I. convention last week did, through a group of analytical papers, take the industry into the basic facts of a number of its economic problems—facts which must be understood and appreciated before the next steps in growth are undertaken. The papers, abstracts of which are printed in the preceding pages, make no attempt to cover the entire state of the art at the present time. Rather have certain situations been analyzed critically and without bias.

Particularly important at this time was the analysis of cost of plant. If the industry's output is to double in the next ten years of national prosperity, does that mean twice the investment? Mr. Kehoe says no. Assuming present prices to continue, he believes the necessary additional plant can be had for possibly a third less than present plant. Information of such a nature can have a profound effect upon future financing.

Everybody has known that accounting costs are rising, but with government agencies asking for more and more reports, with the number of taxes increasing, what can one do about it? An analysis shows that plenty can be done about it and where.

What will be the direction of growth? The answer must come from an analysis of basic data, such as rate influences, costs, competition, possible customer usage, population trend, new fields, trends in customer economics. And then selective selling, that builds load at an ever-improving load factor, will provide the return.

Nor must analysis stop with plant and sales. Today, probably more than ever before, it must be carried into the field of public relations. Before a program can be carried out there must be a basic policy. Who is going to carry out that policy and how?

Such was the direction of analysis in the convention papers. More of this kind of work will be of great value in establishing other bases for future operations and growth. More of these factual analyses might go a long way toward dispelling some of the gloom. The facts may be better than we thought they were. Certainly the analyses presented last week at Atlantic City were far from being discouraging.

The Power of an Idea

ONE MAN gets an idea and a nation changes its course. Another gets an idea from which springs invention that changes the whole social or economic aspect of a people. Some men get ideas that are destructive; others have ideas that are creative.

And because there are too few creative ideas and men should be encouraged to do more constructive thinking, there was set up some fourteen years ago a series of awards for achievements of men in the electrical industry. These annual awards, four in number, one for each of the manufacturing, contracting and wholesaling branches of the industry and one for co-operation, are known as the James H. McGraw Awards. Thirty-three men have received an award.

The awards, however, are not the important thing. The real merit lies in what the awards stand for. When asked to explain last week at the dinner tended him by those who had received the award in past years, Mr. McGraw said the award symbolizes the power of an idea.

The men who have won these awards all had an idea, and in every case that idea influenced others, and in its train brought constructive action that was of great benefit to the industry in which the man worked. Ideas are born of men of vision, men who see a problem or sense a need; but ideas to be of value, to have power, must be carefully thought out and then put into action. The problems, the needs exist today, probably more so than ever before because of economic and political forces outside the industry which are having a marked effect upon the electrical business. Looking backward isn't going to help, nor is fear, nor criticism of others. But an idea which will renew confidence in men in their ability to drive forward and build anew will have the power to alter completely the direction not only of the electrical business but of all American business as well. Such is the power of an idea!

The Blame Will Rest on the Engineers

OFTEN heard among engineers during discussions of power and other public works projects undertaken by government are such expressions as, "Oh, well, if he did not take the job, some other engineer would," or "The engineer builds what he is paid to build." Remarks of this tenor, so commonly heard, indicate either that the speakers believe the engineer has no responsibility for his work or that such responsibility, if it is recognized at all, is regarded very lightly. The feeling is, apparently, that if a project is unsuccessful, either economically or physically, those who promoted, sponsored and made the money avail-

able for it will get the blame. But this feeling is wrong. The blame will rest on the builder.

The reservoir for the Loup River power project, now completed and standing practically idle out in Nebraska, will not hold water. Farmers whose fields are turned into morasses by seepage from the reservoir are asking, as did Edwin Loseke, standing behind his plow talking to a Chicago *Tribune* reporter, "Wouldn't you think the engineers would have known better?" And, telling about the daily necessity for pumping out the basement of her farm home, Mrs. Jacob Gottberg echoes the question, "Wouldn't you think the engineers would have foreseen this?" To these people, and to the large body of citizenry they represent, the engineer is the one responsible, not the local politician who promoted the project, nor the national politician who handed out the money from the United States treasury.

The engineer will not be able to exculpate himself on the plea of emergency, that he did not have time to investigate the economic aspects of the work put before him. There are hardly any among the government projects, particularly power projects, that have not been studied exhaustively again and again, and always to the same conclusion of economic infeasibility. The great quantity of adverse reports from both private and public agencies on practically all of these projects will give the lie to any such defense.

The engineer has much to answer for as he stands today before the bar of public opinion and attempts to explain his work of yesterday. Tomorrow, when he is questioned on what he is doing today, will his answer satisfy the public?

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Effect of Fluorescent Lamps on Electrical Business

WHAT will be the effect of the new fluorescent lamps, which the lamp manufacturers put on the market last month, upon the electrical business? There has been considerable speculation upon this point, largely because of the greatly superior efficiency of the new light sources over filament lamps.

The fluorescent lamps will not replace the filament lamp for general use at the present time. What will happen in the future depends largely upon further developments in the new lamps. Their immediate market is for high-intensity decorative tint lighting.

Ultimately, however, these new efficiencies will find their way into offices and homes. They will supply much larger quantities of light at little or no increase in cost and without any increase in temperature. They can be served from the present wiring system. Before their new intensities will be accepted by the public there must come not only a new design of fixtures but also a new lighting use education.

The result of developments such as this has always been greater use, and such may be expected in this case, just as it was when the tungsten filament lamp supplanted carbon filaments. In this case, however, there is the additional necessity of right equipment design and pre-use customer education.

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Rate Forms Based on Customer Benefits

THE most vulnerable spot in the utility armor to the politician is the rate. It's too high, says he, and the customer echoes the thought. It is immaterial that the complaint is made for and by the unprofitable customer—the rate is too high. For years the utilities have struggled to prove that the rate was not too high; in fact, it was very low and constantly trending downward. And still a large percentage of customers, the low-use customers, will say the rate is too high. If a rate is reduced and the slash amounts to a million dollars annual savings for the customers, the low-use customer hardly feels it because the amount per month is so small.

In the minds of many people there is a real doubt that this problem can be solved by continuing to reduce the rate but retaining the form. New forms are being discussed for residential, commercial and large industrial—rate forms based on customer benefits rather than protection of the utility investment. An annual rate, paid monthly, with unlimited service below a certain demand, is one suggestion. The selling of certain services, such as cooking for a flat rate per month; the selling of a certain number of kilowatts with a low price for all energy used below the contracted demand and a higher price for all above; the selling of power on a load-factor basis—these are some of the thoughts that are being advanced as solutions for the rate problems of today.

These may or may not be the ultimate solution, but in every case they contain certain elements which must accompany any new rate form that is expected to remove pressure from rates. In the first place, the emphasis is on a very low energy rate. Secondly, it is cheap to use all of the electricity one wants to, especially so in the unlimited service rate. Third, it is a rate that is understandable by the customer. Fourth, it puts all customers on the same basis, so that there is no distinction. Fifth, one can tell fairly closely before hand what his cost for energy is going to be.

There have been many rate forms, including room rates, outlet rates, area basis, power-factor demand, etc., which the customer has looked upon as penalty rates designed solely to protect the utility. The new forms now being discussed have no penalty. They are truly promotional, designed to encourage use.

Sooner or later some utility is going to try out some new rate forms embodying the above elements. With any measure of success, it ought to have a widespread use.

What Price Navigation

By CARTER FIELD

The background to Washington news being always much more exciting and frequently more informative than the news itself, Mr. Field's long journalistic experience makes his personal interpretations not only interesting but authoritative.

"FIGURES won't lie, but liars will figure," goes one old saw. Then there's another one: "There are three classes of liars: liars, damned liars and statisticians."

Senator George W. Norris, his satellite, John Rankin of Mississippi, and his patron, President Roosevelt, would like to amend that last. They would strike out the word "statisticians" and insert "army engineers."

It's particularly maddening, because these army engineers have so many friends on Capitol Hill. President Roosevelt's original reorganization plan, which would have given him the right to switch about government bureaus and functions to suit himself, would have solved part of the difficulty. He could have transferred functions from the army engineers wheresoever he wished. But even his friends on the special reorganization committee knew they couldn't get by with that. So they wrote specific language into the bill they reported, providing that there must be no tinkering with the functions of this particular body!

That was when they felt *sure* that the reorganization bill would pass! And even Tommy Corcoran didn't attempt to lobby that proviso out of the bill. He knew it couldn't be done.

No more powers

Norris spoke very freely during the rivers and harbors bill discussion. He didn't want more powers written into the law for the engineers, especially when these powers might possibly have some connection with government development of water power. He remembered too many things. For example, Passamaquoddy, which the army engineers said was uneconomic time after time.

But there's something much closer home than that ill-begotten tidal project on the Bay of Fundy. It's nothing less than TVA, which Norris, with some right, regards as his own baby.

This is not intended as a defense of the army engineers. They have their political astigmatism well developed. If enough influential senators and representatives want a project the army engineers will duly report what it will cost, and they won't be too rough in their language, even if they do consider the whole business cockeyed. In fact, when it comes to figuring on making a stream navigable, they do their best to present the bright side of the picture, so to speak. That's been their function for a long time, and nobody working for the government ever publicly belittles his own function. That's not the way to get more power, and glory, and appropriations.

So let's assume for a moment that navigation of the Tennessee River is really a sane thing. Let's forget Senator Burton's often-made statement that the government could afford to buy all the freight that would ever be offered for shipment on this river, burn it and save money as against developing the stream. A statement, by the way, which has never been denied by any traffic expert. And never will be. Let's forget that the chief purpose of this development of navigation is to reduce freight rates, whereas every one in the government is worried about what is going to happen to the railroads, and that the railroads in this particular territory are among the hardest hit in the whole country.

What should it cost

Let's just coldly consider that navigation of the Tennessee River is desirable. The point then arises: What ought it to cost?

The army engineers figured that a long time ago. They have refigured it many times. Their figure, officially made public, is $74,709,000.

But that isn't all the army engineers have done to cause more wrinkles in the brows of Roosevelt, Norris and Rankin. They figured out the average annual flood damage in the valley. That figure is $1,784,061.

Daniel W. Mead, former president of the American Society of Civil Engineers, has figured that only $36,000,000 of the TVA's proposed expenditures could reasonably be allocated to flood control.

Mead does make a concession in the Norris direction. He admits that the high dams built by TVA, and to be built, would aid navigation more than the plan proposed by the army engineers, so that perhaps as much as $90,000,000 should be allocated to navigation.

Waving aside the point that it has been proved many times that even the $74,709,000 figure is an economic absurdity, and conceding the highest figures, this would make the total which should be allocated for navigation and flood control in the TVA development $126,000,000.

But it is common knowledge at Knoxville that the total cost of TVA, when completed, will exceed $500,000,000! The lowest estimate recently made is $479,000,000. It is true that part of this money has and will be spent for development of the valley—free fertilizer, soil erosion, etc. Official figures are not available. But it would have to be a sum that would shock even Henry A. Wallace to affect seriously any calculations as to how much of the cost of TVA should be allocated to power.

New Dealers worried

Mr. Mead's figures worry the New Dealers no little. "On the unwarranted basis of the TVA estimates," he says, "it is apparent that it estimates the cost of power at about 2.11 mills per kilowatt-hour. On a more reasonable basis of cost of the plants and of the power that can be sold the probable cost will be from 5 to 7 mills per kilowatt-hour. Steam power can certainly be generated in the Tennessee Val-

[*Continued on page 131*]

News OF THE WEEK

TVA Negotiations to Purchase Utility Properties are Suspended

Conference between Director Lilienthal and President Willkie of Commonwealth & Southern hits snag — Knoxville buys Tennessee Public Service System — Biddle named counsel to inquiry group

Negotiations between the Tennessee Valley Authority and the Commonwealth & Southern Corporation for sale of utility properties in the TVA area came to a temporary collapse this week, when officials could reach no agreement on a valuation fixed by independent appraisers.

Following the meeting, which was the first since completion of appraisal of the properties, David E. Lilienthal, TVA director, and Wendell L. Willkie, president of C. & S., issued a joint statement in which it was stated that the two negotiators had held two conferences to discuss the question of purchase of the properties by the TVA. It was stated that after several hours of discussion there was a suspension of negotiations to a date to be fixed later.

It is understood that since TVA has so expanded its network of transmission lines and has installed so much generating equipment the primary objection is purchase of distribution systems. On this basis, as in other negotiations, TVA is seeking a knockdown price for all facilities, with little value placed on generating stations.

While negotiations have been suspended temporarily, future conferences will be held when some of the major questions raised can be worked out as to how far TVA is willing to take over generating stations and what value will be placed upon them.

Contract for the sale of the electric properties of Tennessee Public Service in Knoxville to the city was signed this week. The deal involves payment of $8,035,000 for all the company's properties except the street railway system. The city will pay $5,483,500 for the portion in Knoxville and the TVA will purchase the remainder, including transmission lines.

Holders of Tennessee Public Service $7,000,000 of 5 per cent bonds are being offered 97½ contingent upon 80 per cent of the bonds being deposited by August 13. The bonds were originally offered at 96½.

Stockholders of National Power & Light, which owns the T.P.S. common, will meet early in July to vote on the transaction. T.P.S. stockholders, including the preferred, will vote July 11.

Biddle named counsel

Last week Francis Biddle, former chairman of the old National Labor Relations Board, was appointed counsel of the joint Congressional committee investigating TVA. Mr. Biddle declared that one of the "most essential" things to be considered was the fairness of the TVA yardstick. He asserted that the committee would go into the factors constituting the base on which the TVA sells its power in competition with private utilities.

Mr. Biddle explained that general hearings would be resumed before the end of July and the charges and counter-charges by the TVA directors should be the subject of further evidence. He said that "that phase of the investigation is not completed."

It was indicated by Mr. Biddle that both the TVA and the utilities in the area would be investigated simultaneously.

Cities in the TVA area are pushing forward their plans to build distribution systems for TVA power.

Memphis has started servicing customers of its new municipal system and has signed up more than 1,500 customers. The city is negotiating with Memphis Power & Light for purchase of the properties.

In Chattanooga the city has approved further plans and specifications for equipment to cost $170,000. The city would purchase the properties of Tennessee Electric Power, but is ready to go ahead with its plans for a municipal system should negotiations bog down.

Humbolt, Tenn., City Council has authorized City Attorney Lloyd S. Adams to draft an offer for the properties of the West Tennessee Power & Light Company in Humbolt, Medina, Fruitland and Gadsden. Clarksville, Tenn., has let a contract of $85,793 for a power line to serve the city with TVA power.

The TVA investigating committee appointed Tom Panter, engineer for Los Angeles Power and Light Board, as engineer for the committee. Mr. Panter is an expert on cost allocations. Major-Gen. E. M. Markham had refused.

As Congress adjourned, it added $50,000 to the $50,000 already allotted to the Congressional committee investigating TVA.

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Rates at Bonneville Get Approval of FPC

Revised rate schedules on the kilowatt-year basis for Bonneville as submitted by Administrator J. D. Ross have been approved by the Federal Power Commission.

The commission decided that the benefits of an integrated transmission system and the equitable distribution and the widest possible diversified use of the electric energy developed at the government's power project will be attained by the establishment of, first, rates at the power site, and, second, uniform rates over the transmission system within economical transmission distance of the project.

At site rates are $14.50 per kilowatt-year for prime power and $9.50 per kilowatt-year for secondary power. Transmission system rates are $17.50 per kilowatt-year for prime power and $11.50 per kilowatt-year for secondary power.

Sales Drive Opened by Nash-Kelvinator

The National Salesmen's Crusade, sponsored by Nash-Kelvinator, moved into New York City this week with a gathering of 1,550 representatives of utilities, manufacturers, sales outlets and business at a luncheon at the Waldorf-Astoria. More than 400 members of the Sales Executive Club of New York joined forces in the campaign.

Richard W. Lawrence, president of the Chamber of Commerce of the State of New York, declared that it is up to the salesmen and sales managers to lead business out of the slump by stimulating buying and finding new markets.

H. W. Burritt, vice-president of Nash-Kelvinator, listed five points upon which the campaign is based. He declared that unemployment is now recognized as a national problem; that the ability to buy exists, although it is on a curtailed basis because of unemployment; that definite steps to employ the unemployed can be found through increased sales; that there is a great opportunity open to salesmen to solve the problem by stimulating buying, and that all business will be helped by other businesses. He said boiled down the problem is "sales mean jobs."

George W. Mason, president of Nash-Kelvinator, outlined the plan and declared that it is the responsibility of business to put the unemployed back to work. He said that the hope of prosperity is through sales efforts.

Dana Cole, president of the Lincoln, Neb., Chamber of Commerce; Gene Flack, trade relations counsel, Loose-Wiles Biscuit Company, and Merle Thorpe, editor of the *Nation's Business*, were other speakers on the program, which was broadcast by telephone hook-up to 21 similar meetings in as many cities.

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Wholesale Group Complaint Dismissed by Commission

A complaint filed in behalf of the Eastern Electric Wholesale Association against practices of Consolidated Edison Company of New York, Inc., and its subsidiary corporations, in allowing credits on electric bills toward the purchases of electric appliances from approved dealers has been dismissed by the Public Service Commission.

The complaint stated that the utilities were "discriminating in the cost of their service to various consumers in the guise of a discount or a rebate to be allowed to the consumer on the purchase of electrical appliances and supplies."

Commissioner George R. Van Namee, in an opinion, stated that the rebate by the retail dealers, under the present campaign, is absorbed by the retailers and does not reduce the revenue of the utility.

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Debate Control of "Incidental" Power

Federal versus state control of "incidental" power and the attitude of the Corps of Engineers toward its development played a prominent part in Senate debate on two bills last week.

In debating the river-and-harbor authorization bill, Senator Norris of Nebraska objected strongly to the statement of policy, contending that the language would set up the War Department as a policy-determining body over not only navigation improvements, but, in short, over all proposals having to do with the utilization or control of water resources, including power development.

The matter was finally compromised by substituting without change the language used in previous acts so as to read ". . . Federal investigations and improvements of rivers, harbors and other waterways shall be prosecuted by the War Department . . . except as otherwise specifically provided by act of Congress." . . . This bill has gone to the White House for signature.

The same solution was adopted for the flood control authorization bill; the revised language was abandoned in favor of a declaration of policy copied from the omnibus flood control act of 1936. This gives the Corps of Engineers authority over the investigation and improvement of rivers for flood control, but places measures for water retardation and soil erosion prevention under the Department of Agriculture. In addition, the Senate modified the usual provision that penstocks may be installed in flood control dams for the later development of power to make this feature mandatory in all dams when approved by the Federal Power Commission.

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Employees Get 32 per Cent

Pointing out that Consolidated Edison Company and its associated companies are plants and people, Ralph H. Tapscott, president, has prepared a simplified financial statement of the business. He shows that out of the system's revenues for 1937 the investors got a fraction more than a 4 per cent return on the total investment, while employees received, for current operations only, about 32 per cent of the year's revenues.

Atwater Named Head of I.E.S. at Meeting

Approximately a hundred members and guests of the New York section, Illuminating Engineering Society, attended the annual spring meeting held last week at Briarcliff Lodge, Briarcliff Manor, N. Y., at which DeNyse W. Atwater, manager of commercial engineering of the lamp division of Westinghouse Electric & Manufacturing Company, was elected president for the year beginning October 1.

The meeting was held in honor of Prof. Henry B. Dates, Case School of Applied Science, Cleveland, who is retiring as president of the society. Other officers elected included A. D. Cameron of the Holophane Company as vice-president; Howard M. Sharp of Buffalo, Niagara & Eastern Power Corporation, as general secretary; Henry G. Clum of Jersey Central Power & Light, as treasurer, and R. W. Staud of Des Plaines, Ill., and H. L. Johnston of Pittsburgh, as directors to serve for three years.

Professor Dates, who recently completed a trip to the Pacific Coast, related his experiences and brought greetings from the Nebraska-Iowa chapter, youngest member of I.E.S. to the New York section, the oldest.

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Norfolk Board to Consider Virginia Electric Contract

A special meeting of the Norfolk County Board of Supervisors may be called some time within the next two weeks to consider the pending proposed contract between the Virginia Electric & Power Company and the county. Two months ago Chairman George C. Coleman, of the Board of Supervisors, appointed a committee to confer with officials of the power company relative to an agreement for power rates that would be acceptable to both the county and power company.

This committee has conferred with the power company officials and has worked out an agreement that county officials believe will be acceptable to both the Board of Supervisors and the power company.

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Coast Electronics Course

Demonstrations of various kinds of industrial electronic equipment featured a recent series of six two-hour classes on electronics, conducted by the Electrical Maintenance Engineers Association of Southern California. E. W. Morris, engineer of the Westinghouse Electric & Manufacturing Company, supervised the lectures. Attendance exceeded 100 at each of the sessions.

Kellogg Praises Fine Papers at E.E.I. Meet

Utility executives returning from the sixth annual convention of the Edison Electric Institute, held last week in Atlantic City, were of the opinion that the meeting produced results which will have lasting results in the industry.

Charles W. Kellogg, who is beginning his third term as president of the Institute, declared that it was a very fine convention with many interesting papers presented. He said that he found every one alive to the present situation and giving serious thought to the many problems. It was his opinion that from the discussions which took place advancement would be made in utility operation and greater use of electricity would result.

It was evident before the convention closed that utilities will give more consideration to public relations and wider public understanding of the problems of utility operation. The fact that utility leaders were meeting with SEC officials in discussing provisions of the utility act and their application was well received by the more than 1,200 delegates.

An encouraging note was sounded at the meetings of the plant accounting, sales; classification of accounts; customer relations, accounting and collections; and purchasing, stores and transportation committees in developing systems to meet new requirements.

Prospects of increased sales of electric ranges were seen in a report submitted by Harry Mauger, chairman of the electric range section, to a meeting of the National Electrical Manufacturers Association during the E.E.I. convention. It was pointed out that sales of electric ranges have quadrupled twice in the past five years—the fastest rate of increase in the electric appliance business. Present indications point to a maintenance of this rapid pace of public acceptance, it was said.

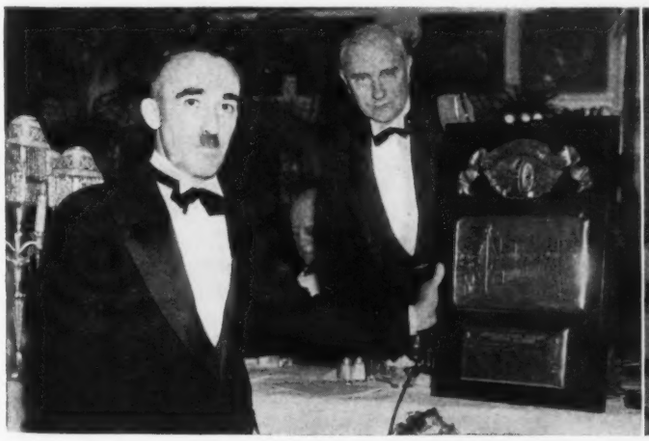
A wide differential exists between actual cost of cooking by electricity and the idea which exists in the minds of many women, Mr. Mauger said. Many women believe that electric cookery costs as much as $10 a month, whereas a survey of 1,384 homes in nineteen cities disclosed that the average cost is $2.30, and 80 per cent of the women interviewed said their bill was less than $3 a month.

Wendell L. Willkie, Commonwealth & Southern; Ralph Kelly and C. E. Stephens, Westinghouse

W. H. Hodge, Public Utility Engineering & Service; H. Obermeyer, Consolidated Edison

W. W. Freeman and Philip G. Gossler, Columbia Gas & Electric

P. S. Millar, Electrical Testing Laboratories



H. P. Liversidge presenting to H. J. Gallagher, Consumers Power (left), Thomas W. Martin award for rural electrification

Harry Curtis, Tennessee Electric Power (left), receiving the Augustus D. Curtis award from Darwin Curtis

Jobbers Opposed to Courtesy Discounts

A statement and clarification by the Westinghouse Electric & Manufacturing Company and its agent jobbers of their policy of opposition to "courtesy discounts" on household electrical appliances was made at the recent annual meeting of Westinghouse Agent Jobbers' Association at Hot Springs, Va.

Following the presentation of the Westinghouse company's attitude by R. E. Imhoff, sales manager of the merchandise division, the association unanimously adopted a resolution aimed at clarifying its policies for the trade and the public. This resolution was presented by H. M. Moock, president of the Moock Electric Supply Company of Canton, Ohio.

At the election of officers J. S. Shaw, vice-president of the Moore-Handley Hardware Company, Birmingham, Ala., was re-elected president; A. E. Allen, vice-president; N. G. Symonds, vice-president; H. M. Moock, secretary; L. B. Bournes, assistant secretary and treasurer, and J. J. Jackson, counsel.

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Italy Commences Work on Big Hydro-Electric Project

Work has commenced in Italy on a new hydro-electric project which, it is claimed, will ultimately provide the most powerful water power station in Europe.

The new station will be constructed in the Abruzzi on the Vomano mountain, northeast of the Gran Sasso Massif, the waters of which will be collected, by means of a system of tunnels 25 miles long, in an artificial lake with a capacity of 500,000,000 cubic meters (110,000,000,000 gallons). Plans include the construction of three power stations, one of which will be capable of producing 24,000 hp.

Another hydro-electric project, in process of realization in the Isonzo Valley, comprises the construction of a chain of six power stations, each fed from an artificial lake, which will eventually provide power representing about 500,000,000 kw.-hr. Part of this project is scheduled for completion this year.

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Rural Conference Called

A hearing to attempt the fixing of "a fair price" public utilities may charge rural electrification units is to be held in Des Moines, Iowa, June 22 by the Iowa State Commerce Commission.

The hearing was called, according to commission officials, because of a dispute between rural electrification officials and public utility companies as to what the privilege or service of carrying the rural electrification wires on public utility poles is worth. In some cases the question is how much rural electrification units may charge public utilities for the same service.

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Ask Rate Revisions by Baltimore Utility

A petition asking that the Maryland Public Service Commission investigate the rates charged by the Consolidated Gas, Electric Light & Power Company of Baltimore has been filed by the City Gas and Electric Committee, of which Donald C. Foote is chairman.

At the same time Joseph A. Wilmer, people's counsel before the commission, filed a petition stating that he considered the petition had merit and that the commission should determine a reasonable rate to be charged domestic and small commercial consumers of both electricity and gas.

He also said that he had reached the conclusion that a *prima facie* case had been established that the rates are excessive and unjust, as charged in the petition of the committee. This petition also charged that the properties and holdings of the utility are held at unjust and excessive valuation.

Along with this latest action in the case, two petitions were also filed by groups of individuals urging the investigation. One bore the names of 121 persons and the other the names of 212. The Alameda-Harford Neighborhood Association has also entered the case by filing a resolution favoring a revision of the rates.

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Abitibi Power Appeal Lost

Justice McTague's dismissal of a plea for approval under the Ontario Judicature Act of a plan of reorganization for the Abitibi Power & Paper Company—a motion made by the trustee for the bondholders—was upheld recently in an Appeal Court decision at Osgoode Hall, Toronto.

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City Board Lets Contracts

Greenwood (Miss.) Light and Water Commission has awarded contracts on plant equipment amounting to $100,000. For furnishing boiler, at a cost of $54,000, the contract was given to Combustion Engineering Company of New York; for stoker, at a cost of $26,000, to American Engineering Company, Philadelphia, and to install this equipment, at a cost of $27,000, to Albert N. Blair, Birmingham, Ala.

Ordered to Explain Stock Acquisition

New Jersey Power & Light Company has been ordered by the Federal Power Commission to submit in writing under oath on or before June 24 detailed information concerning its reported acquisition of 341,350 shares of common stock of the Jersey Central Power & Light Company in apparent violation of the Federal Power Act and show cause, if any, on or before June 24, why the commission should not proceed to enforce the requirements of said act.

The commission's order states that the New Jersey Power & Light Company allegedly acquired the 341,350 shares of Jersey Central Power & Light stock on March 11, without first having secured the approval of the commission as required by the Federal Power Act, which provides that no public utility shall purchase, acquire or take any security of any other public utility without first having secured an order of the Federal Power Commission authorizing it to do so. Both of the companies are affiliated with the Associated Gas & Electric System.

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Post Resigns Presidency to Become Board Chairman

Frank T. Post retired as president of the Washington Water Power Company, Spokane, this week to become chairman of the board. Kinsey M. Robinson, president of the Idaho Power Company, will succeed him as president and will also be elected to the board of directors.

C. J. Strike, formerly president of the Northwestern Public Service Company, Huron, S. D., has been selected to succeed Mr. Robinson in Boise. A. B. Sanborn, formerly vice-president of the East Kootenay Power Company, Fernie, British Columbia, has replaced Mr. Strike.

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Two Utilities Open Selling Drive on Water Heaters

Portland General Electric and Northwestern Electric began on June 1 selling automatic water heaters at manufacturers' suggested list prices. This means a rise in the retail price of about 10 to 15 per cent. The move was designed to encourage appliance dealers and plumbers to put more effort on selling water heaters.

Both companies agree to install heaters sold by dealers at a fixed price for a normal job of $14.50 for wiring and $7 for plumbing and carry the cost on a time contract for the purchaser of $1 down and $1 a month.

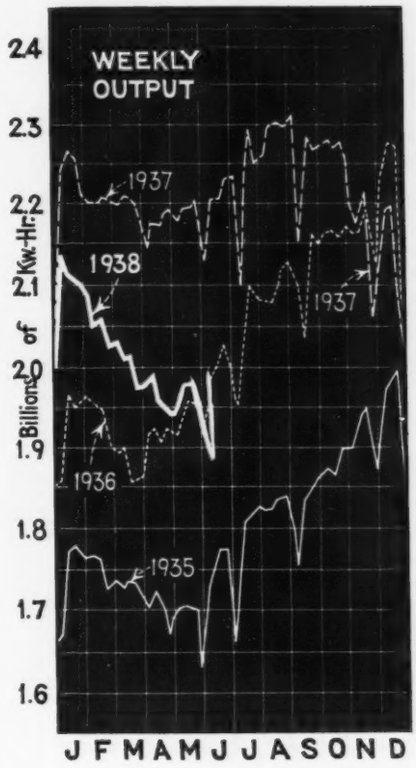
Output Resumes Rise

Full week after holiday brings increased production — Cuts disparity against 1937 to 10%

Resuming the upward trend interrupted by Memorial Day, the output of the electric light and power industry rose in the week ended June 11 to 1,991,787,000 kw.-hr., according to the Edison Electric Institute. This is 53,000,000 kw.-hr. more than the production in the last week of April, which marked the low point (barring the holiday dip) of the output curve.

Comparisons with other years are not readily made because the minimum came at different times, but it is evident that the rise during the past five or six weeks has been steeper than it was a year ago. This is reflected also in the per cent change from 1937. While present operations are still 10 per cent under last year's, the disparity has been decreasing. At the end of April it was 11.6 per cent.

The most severe spring-time decline recorded in these weekly statistics occurred in 1932, when the week of June 11 was 184,000,000 kw.-hr. below the January peak. This year, for the same dates, it was 147,000,000 kw.-hr.



Weekly Output, Millions Kw. Hr.

1938	1937	1936
June 11..1,992	June 12..2,214	June 6..1,945
June 4..1,879	June 5..2,131	May 30..1,922
May 28..1,973	May 29..2,207	May 23..1,955
May 21..1,968	May 22..2,199	May 16..1,962
May 14..1,968	May 15..2,195	May 9..1,948
May 7..1,939	May 8..2,176	May 2..1,929
Apr. 30..1,939	May 1..2,194	Apr. 25..1,933

Per Cent Change from Previous Year

Region	Week Ending June 11	June 4	May 28
New England	−11.9	−11.2	−11.6
Middle Atlantic	− 5.4	− 6.7	− 2.8
Central Industrial	−16.8	−17.8	−17.4
West Central	− 5.3	−10.1	− 6.2
Southern States	− 7.7	−10.1	− 9.7
Rocky Mountain	−22.9	−28.4	−21.7
Pacific	− 1.1	− 2.8	− 5.0
United States	−10.0	−11.8	−10.6

New York Welders in Annual Meeting

Films of the first two buildings built by welding under the new New York building code featured the annual meeting of the New York section of the American Welding Society this week.

In addition to newsreel photos of the first building, a 14-story apartment building, color movies of the second building, a four-story school, were shown by Arthur N. Kugler, mechanical engineer with the Air Reduction Sales Company, with G. D. Fish, New York consulting engineer on both jobs, contributing technical information. A third technicolor sound film, "Steel—Man's Servant," was shown through the courtesy of the United States Steel Corporation.

At the election of officers J. L. Wilson of the American Bureau of Shipping was named the new chairman; Charles Kendel, Craftsweld Equipment Corporation, first vice-chairman, and J. T. Phillips, Combustion Engineering Company, second vice-chairman. Dr. G. B. Slottman, assistant manager of the applied engineering department, Air Reduction Sales Company, was re-elected secretary-treasurer. Attendance was slightly more than 300.

•

Court Order Approves New Step in Standard Gas Case

An order has been entered by the United States District Court for the District of Delaware at Wilmington approving the proposed certificate of amendment of the amended certificate of incorporation and certificate of amendment of the by-laws of Standard Gas & Electric Company and also approving the proposed supplemental trust agreement between the company and Guaranty Trust Company of New York and Continental National Bank & Trust Company of Chicago, as trustees.

These instruments are being executed to put into effect provisions of the plan of reorganization of November 1, 1937, as modified in the reorganization proceedings, which modified plan was confirmed by the court March 5, 1938, according to Bernard W. Lynch, president of the company.

Mr. Lynch said the final step in the reorganization would be a stockholders' meeting for election of a new board of directors to be held later this month.

•

Greenwood County Sues Duke Power

Greenwood County, sponsor of the proposed $3,000,000 Buzzard Roost power project, has filed suit against Duke Power Company, asking for $850,000, which, the county alleges, it lost in income as a result of delay by litigation in starting the project.

Duke Power opposed the PWA-financed project in a court fight that went to the U. S. Supreme Court, which decided in favor of the project sponsors. According to the complaint, operation of the plant, originally scheduled for February 1, 1936, is not expected to occur before June 1, 1939.

Federal Judge C. C. Wyche set a hearing for July 1, then signed an order disqualifying himself to hear the case on the grounds that he had been employed by the utility as counsel when it first opposed the project. Judge John C. Parker of Charlotte will appoint a judge to hear the case.

•

Utility Sale Hearing Set

FPC will hear evidence on June 23 at a hearing on an application by the Twin State Gas & Electric Company for approval of the sale of its properties in New York State to the New York Power & Light Corporation for $586,000, plus an amount equal to the value of certain net quick assets as they exist at the date of the sale.

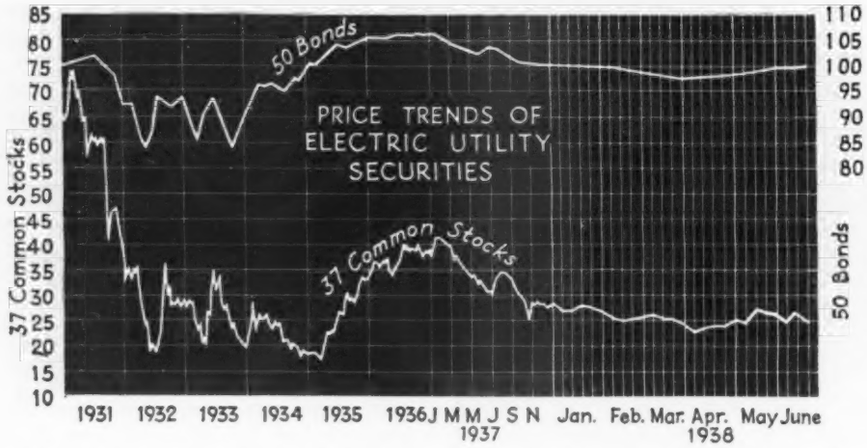
Properties are reported to have cost originally $650,588, with the book cost put at $621,894 as of February 28, 1938. The property involved is that used by Twin State Gas & Electric in generating, selling and distributing electric energy in Hoosick Falls and Hoosick.

•

Buy American Appliances

Electrical kitchen appliances of American manufacture are well and favorably received in the Netherlands and such articles have gained a firm footing in that market, according to reports from the American Consulate, Rotterdam, made public by the electrical division, Department of Commerce. American washing machines particularly are gaining in popularity.

Stocks and Bonds Go Slightly Lower


50 Bonds
PRICE TRENDS OF ELECTRIC UTILITY SECURITIES
37 Common Stocks
37 Common Stocks
50 Bonds
1931 1932 1933 1934 1935 1936 J M M J S N 1937 Jan. Feb. Mar. Apr. 1938 May June

Both electric utility stocks and bonds registered slight dips during the week. "Electrical World" stock index dropped from 25.4 to 24.8, the mark of two weeks ago. Index a year ago, 30.8. "Electrical World" bond index lowered 0.1 point to 99.4

Columbia Gas Case Hearing Reopened

Columbia Gas & Electric Corporation's application for reopening its hearing to consider payment of dividends on its preferred and preference stocks totaling $1,627,175 has been granted by the SEC. The commission set June 25 for the hearing. Columbia asked the SEC to reopen the case for the purpose of considering payment on August 15 of the regular quarterly dividend on its cumulative 6 per cent preferred stock, series A; cumulative preferred stock, 5 per cent series, and 5 per cent cumulative preference stock. Last April the commission denied the corporation's application to pay dividends on its common stock in 1938, totaling $6,152,141, holding that such dividend payments in effect would represent dissipation of its own working capital and that of its subsidiaries. At that time SEC approved payment of preferred and preference dividends paid on February 15, but reserved its opinion regarding payment of the August 15 and September 15 dividends.

Other statements registered with the commission follow:

Federal Light & Traction Company has filed a registration statement on Form U5B, the complete form for registration under the Holding Company Act.

SEC has granted an application by the Public Service Company of New Hampshire, a subsidiary of the New England Public Service Company, for exemption from the requirement of filing a declaration in connection with issuance and sale of $750,000 of first mortgage 3¾ per cent bonds, series C, due August 1, 1960, and 4,000 shares of common stock, no par value. Bonds will be sold to the Northwestern Mutual Life Insurance Company at 103 plus accrued interest from February 1, 1938. A similar exemption was granted to Central Maine Power Company, also a subsidiary of New England Public Service Company, in connection with $1,000,000 of first and general mortgage bonds, series G, 4 per cent, and 5,000 shares of no-par value common stock. Bonds will be sold to Travellers Insurance Company at 100 plus accrued interest to the date of delivery.

Staten Island Edison Corporation has filed a declaration covering the issuance of $2,000,000 of 4 per cent refunding and improvement mortgage bonds.

SEC has approved a declaration by the Kansas Electric Power Company for the sale of $1,000,000 of first mortgage bonds, series A, 3½ per cent, due in 1966, and 7,000 shares of no-par value common stock. Bonds are to be sold to the Equitable Life Assurance Society of the United States at 94 plus accrued interest.

Associated Corporation, a subsidiary in the Associated Gas & Electric Company system, has filed a declaration covering the issuance of not to exceed $1,000,000 of promissory notes, with interest not to exceed 6 per cent, to be issued to refund its now outstanding 5 per cent promissory note, due July 11, 1938.

New York State Electric & Gas Corporation has filed an application for exemption from the requirements for filing a declaration covering the issuance of $75,000 of 6 per cent customers' receipts, under a customer finance plan for the construction of rural electric line extensions. Hearing has been set for June 27.

Peoples Light & Power Company of New York has registered on Form U5-B, the complete form for registration under the Holding Company Act.

•

Note Issue Authorized

Nevada-California Electric Corporation has been authorized by the Arizona Corporation Commission to issue its note to cover a $700,000 loan from a California bank, giving as security more than 10,000 individual contracts with consumers covering the purchase of electrical appliances. The corporation, with headquarters in Riverside, Calif., furnishes electric power in the Yuma Valley in Arizona. It had previously received the approval of the California Railroad Commission. Under the plan, the loan, which will bear interest at 4½ per cent per annum, will be amortized at the rate of $20,000 a month for three years.

•

United Corporation Defers 75c. Dividend

Directors of the United Corporation at a recent meeting took no action on a dividend on the $3 cumulative preference stock, payment on which is due at this time for the three months ended June 30. It was announced that because of the recent decline and fluctuations in the indicated value of the securities held in the corporation's portfolio the board had deemed it advisable to defer declaration of the 75-cent dividend.

On February 15 shareholders of the company approved a reduction in the stated value of the common stock from $5 to $1 a share, or by $58,144,121, thus lowering outstanding capitalization from $197,109,220 to $138,965,099. This step was taken in view of the Delaware corporation law which forbids payment of dividends if the market value of securities falls below stated capitalization. At present the asset value of the corporation's common stock is below the stated value of $1 a share.

•

Gatineau Plan Approved

At a special meeting held recently shareholders of Gatineau Power Company unanimously approved a by-law providing for the creation of serial and sinking fund debentures to an aggregate amount not exceeding $13,000,000. President G. Gordon Gale, who presided, explained that proceeds of the new debentures will be used in connection with the proposed redemption of 6 per cent debentures maturing in 1941.

Earnings Reports (Utilities)

	Net Income 1938	1937
*Electric Pwr. & Lt. and subs.	$7,929,774	$8,993,929
*United Gas and subs.	8,762,521	11,636,487
†*Associated G. & E. and subs.	34,871,702	36,747,715
*Wisconsin Pub. Serv. and sub.	1,254,782	1,406,589
*San Diego Cons. G. & E.	1,230,672	1,460,382
*Oklahoma G & E.	2,576,459	2,547,134
*The California Oregon Pwr.	919,640	1,115,165
*Puget Sound Pwr. & Lt. and subs.	1,038,809	1,213,569
*Virginia Elec. & Pwr.	3,327,319	3,276,906
*Gulf States Utilities.	1,333,519	888,585
*Utah Pwr. & Lt.	1,541,579	1,605,854
*Kansas Gas & Elec.	1,304,634	1,296,503

* Twelve months ended April 30.
† Operating income, preliminary.

Hydro-Electric Plants Projected in Colorado-Big Thompson Project

Work to start soon on $44,000,000 irrigation and power development following approval by President Roosevelt — River water to be diverted through 13-mile tunnel — Power capacity to be 142,500 kw.

Another government hydro-electric project of major proportions will soon be taking definite shape now that President Roosevelt has approved the starting of construction of the $44,000,000 Colorado-Big Thompson irrigation and power project.

The project gained support under the impetus that it was primarily irrigation and that power development was secondary. However, when maximum generating capacity is installed power is likely to be the dominating factor.

Plan 13-mile tunnel

Colorado-Big Thompson is designed to divert 310,000 acre-feet of water from the Colorado River through a 13-mile tunnel under the Continental Divide to provide a supplementary water supply for lands on this eastern slope.

To start this project Congress appropriated $900,000 in August, 1937. Besides the tunnel and canal system, the project comprises two pumping plants and an initial installation of 30,000 kw. of generating capacity. This will eventually be increased to 142,500 kw. Excess power above the 18,000 kw. demand of the pumping plants will be available for distribution to the public.

Opposed at hearings

During public hearings on the project strong opposition was expressed by many organizations interested in conservation and recreation as well as the National Park Service. It was pointed out during the hearings that proposed tunnel through the Rocky Mountain National Park would probably drain many of the lakes, and that once the power angle caught fancy it would set a precedent that might lead to establishing power projects in all national parks.

Secretary Ickes found the project feasible, but stated that "the law requires that the Secretary of the Interior make a finding of feasibility and that such finding be approved by the President as the last step in authorization of federal reclamation projects."

He said that "the finding is not a matter of choice—it is mandatory."

Proponents of the project stated that the water was necessary to protect from deterioration 615,000 acres of highly developed agricultural land assessed at $125,000,000 and directly supporting a population of 175,000.

Power plant No. 1

A conduit of approximately 5.4 miles in length and 550 cu. ft. per second capacity will connect the east portal of the Continental Divide tunnel with power plant No. 1. The power plant will be located ½ mile east of Estes Park, Colorado, and will contain two 15,000-kva. generating units operating under a static head of 746 ft. The average annual output of the plant is estimated to be 207,000,000 kw.-hr., of which the Granby pumping plant will require 48,000,000 kw.-hr. The balance of the power will be available for commercial purposes.

In addition to this power plant five additional power plants are to be installed as the power market becomes available, Secretary Ickes says. One is to be located on the North Fork of the Thompson River and three others on the main channel of the Big Thompson River. The fifth plant will be built at the Green Mountain Dam.

According to plans the cost of all the power plants and other features of the project allocable to power will be paid from power revenues. The cost chargeable to irrigation is to be repaid in 40 years, without interest, under contracts negotiated by the Bureau of Reclamation.

•

Increases Lighting Business

New commercial and industrial lighting business of the Georgia Power Company for April amounted to $36,099, against $35,809 in April a year ago. The company reports that the increase was made despite a decrease in personnel and the number of lighting jobs completed.

•

Renton Line to Be Resumed

Seattle City Light officials have announced that they will resume construction of their Skagit transmission line in the Renton area. The announcement followed action by the Renton City Council which gave City Light a twenty-five year franchise. Service of papers in the condemnation proceedings for an alternate route outside Renton was halted. The city had started to condemn for this route because Renton had refused a franchise. Seattle City Council is expected to accept the Renton franchise offer by ordinance soon.

•

Dedication Ceremony Held at Danville

Four years of costly planning came to fruition on June 7 when Danville's municipal hydro-electric power plant was dedicated formally in Patrick County, Virginia. Howard A. Gray, assistant to Secretary of the Interior Harold L. Ickes, dedicated the project, the honors of the day being shifted to him when Danville city officials received word that Senator George W. Norris of Nebraska would not be able to give the dedicatory address. A number of state officials and lesser PWA officials attended.

Hitherto heralded as a $3,250,000 project, it develops now that its total cost will be $3,403,454, for the city applied to the project the premium from the sale of bonds and there is an item resulting from a revision of the plans which necessitated the boring of tunnels so as to screen the pipe line. The city has issued two sets of bonds, the first for $1,513,000 and the second for $250,000, a total of $1,763,000. The premiums derived from the bonds run the city's total investment in The Pinnacles up to $1,875,000, with the federal government giving $1,529,954.

•

Propose Memoir of Life of Dr. William C. Unwin

Effort is being made in London to raise a fund to provide a suitable memoir of the life of Dr. William C. Unwin. The fund, which would also amplify the annually awarded Unwin Scholarship, is being raised by the Unwin Memorial Committee, composed of Dr. Unwin's former students and associates, with which representatives of the American Society of Civil Engineers and the American Society of Mechanical Engineers were affiliated.

Dr. Unwin, a world figure in engineering and education, was best known in the United States for his work on the International Niagara Commission and for his textbooks. Contributions to the fund may be sent to E. G. Walker, honorary treasurer, 82 Victoria Street, London, S.W. 1, England.

Program Announced for A.I.E.E. Meeting

Plans have been completed for the summer convention of the American Institute of Electrical Engineers, to be held at the Mayflower Hotel in Washington, D. C., June 20-24.

The address of welcome will be delivered on Tuesday, June 21, by William McClellan, honorary chairman, and presentation of Institute prizes for papers and of the Lamme Medal to Dr. R. E. Doherty will be made. Sessions will be held on power transmission and distribution and on communication and a symposium will be held on the correlation of mathematics and physics with electrical engineering subjects. President W. H. Harrison will make an address on Wednesday.

D. C. Prince, E. A. Williams, Jr., R. M. Spurck and H. E. Strang, all of General Electric Company; Philip Sporn and H. P. St. Clair of American Gas & Electric Service Corporation, and R. C. Dickinson and Jerome Sandin of Westinghouse Electric & Manufacturing Company will make addresses at the session on fault interruption. The electrical machinery group will be addressed by H. C. Stanley, American Gas & Electric Service Corporation; W. R. Appleman, Marathon Electric Manufacturing Company, and E. D. Treanor, General Electric Company.

At the symposium on fluorescent lighting G. R. Fonda and A. L. Powell, also General Electric, will deliver addresses. J. V. Alfriend, Jr., Federal Power Commission, will address the conference on power requirements in electrochemical and allied industries, as will E. E. Merrick, General Electric, and Herbert Speight, Westinghouse Electric & Manufacturing.

•

Women's Round Table Tells Service of Home Economist

Home service directors of utility companies joined with editors of national women's magazines recently in a discussion of women's service to the electrical industry in promoting wider use of electricity and electrical appliances at a meeting of the Electrical Women's Round Table in New York City.

Utility speakers included Emma M. Tighe, Boston Edison Company; Sally Ambrose, Consolidated Edison Company of New York, Inc., and Clara Zillesen, Philadelphia Electric Company.

•

Bids on Wabash Valley Dams

Announcement was made late last month that bids for construction of three dams on the Salamonie River in the Wabash Valley of Indiana will be accepted within 90 days by the Acme Engineering Service, Inc., Fort Wayne, Ind. No federal aid will be used. The project will be used for development of hydro-electric power.

At the first and third dams hydro-electric plants will be constructed with a combined capacity of 2,000 hp. a field office has been set up at Lagro, from which all construction work will be directed. The project is expected to be completed in eighteen months.

•

Bids Asked for Regulators

Sydney County Council, Sydney, New South Wales, Australia, is asking bids until July 14 for a quantity of voltage-regulating equipment for use on low-voltage circuits.

Meetings

Society of Chemical Industry — Annual meeting, Ottawa, Canada, June 20–22.

American Society of Heating and Ventilating Engineers—Summer meeting, The Homestead, Hot Springs, Va., June 20–22. A. V. Hutchinson, secretary, 51 Madison Avenue, New York, N. Y.

American Society of Mechanical Engineers—Semi-annual meeting, St. Louis, Mo., June 20-24. C. E. Davies, national secretary, 33 West 39th Street, New York, N. Y.

American Institute of Electrical Engineers—Summer convention, Washington, D. C., June 20–24. Pacific Coast Convention, Portland, Ore., August 9–12. H. H. Henline, national secretary, 33 West 39th St., New York, N. Y.

Canadian Electrical Association — Annual convention, Seigniory Club. Province of Quebec, Canada, June 22–24. B. C. Fairchild, secretary, 804 Tramways Bldg., Montreal, Que.

National Electrical Credit Association—Annual convention, Hotel Statler, Detroit, Mich., June 23–24.

Economics Conference for Engineers—Annual meeting, Stevens Engineering Camp, Johnsonburg, N. J., June 24–July 2.

American Society for Testing Materials—Annual meeting, Chalifonte-Haddon Hall, Atlantic City, N. J., June 27–July 1. H. E. Hess, assistant secretary, 260 South Broad Street, Philadelphia, Pa.

American Association for the Advancement of Science — Summer meeting, Ottawa, Canada, June 27–July 2.

World Power Conference—Vienna sectional meeting, August 25–September 2. Executive committee, U. S. National Committee, World Power Conference, 4 Irving Place, New York, N. Y.

Rocky Mountain Electrical League—Annual meeting, Canyon Hotel and Lodge, Yellowstone Park, Wyo., August 29-31. George Lewis, managing director, Gas and Electric Building, Denver, Colo.

Illuminating Engineering Society—Annual convention, Nicollet Hotel, Minneapolis, Minn., August 29–September 1. A. D. Cameron, general secretary, 51 Madison Avenue, New York, N. Y.

Indiana Electric Association—Annual convention, French Lick, Ind., September 29–October 1. Tom C. Polk, secretary, 607 Traction Terminal Bldg., Indianapolis, Ind.

American Transit Association — Annual meeting, Toronto, Canada, October 2–7. Charles Gordon, managing director, 292 Madison Avenue, New York, N. Y.

Consolidated Edison Plans Fair Exhibits

As its principal exhibit at the New York World's Fair, 1939, Consolidated Edison Company of New York, Inc., and affiliated companies will present a colored, lighted and animated architectural model of the New York metropolitan area, Floyd L. Carlisle, chairmain of the Board, announced this week.

More than 4,000 buildings, studded with 130,000 windows, will be shown in this diorama, which is said to be the world's largest, and will have a 204,000-watt illumination. Nearly a quarter mile of colored neon tubing will represent the city's underground electric, gas and steam networks, while a model subway system, with trains designed for a "World's Fair run" of 35,000 miles, will provide transportation highlights. Translucent generating stations will suggest the transformation of coal into electricity, gas and steam.

The diorama, which will be nearly a city block long and higher than a two-story building, has been designed by Walter Dorwin Teague and Frank J. Roorda, associate. Besides the diorama, the company's building will house a sequence of animated, three dimensional exhibits to illustrate the part played by the utility in metropolitan area life. Among these displays will be some dramatizing the work of "Bill Jones," who typifies the Consolidated Edison System's 40,000 employes.

•

M.I.T. to Study Utilization of Sun Power for 50 Years

Physical and chemical methods of utilizing solar energy directly will be investigated for the next 50 years by the Massachusetts Institute of Technology under a research gift of $647,700 from Dr. Godfrey L. Cabot of Boston, according to President Compton.

While details of the program remain to be completed, Dr. Vannevar Bush states that the initial objective will be to determine whether the use of direct solar energy is economical and feasible, and if so, under what conditions.

•

Lamp Show Plans Announced

Final plans for the New York Lamp Show have been announced by George F. Little Management, Inc. The show will be held July 18-22 at the Hotel New Yorker. More than 150 exhibitors will display some 50,000 lamps on five floors of the hotel.

INDICATING SECONDARY FUSE

OUTDOOR TYPE

FOR LOW-COST FAULT ISOLATION

YOU can improve service three ways with the new low-cost indicating secondary fuse.

1. Reduce light flicker by using them for banking of transformer secondaries.
2. Protect transformers from secondary faults by installing them in the secondary leads of transformers.
3. Isolate service-entrance faults by placing them on branch circuits.

The new secondary fuse is so low in first cost that it can be profitably applied on hundreds of secondary circuits where more elaborate protective devices are not economically justified.

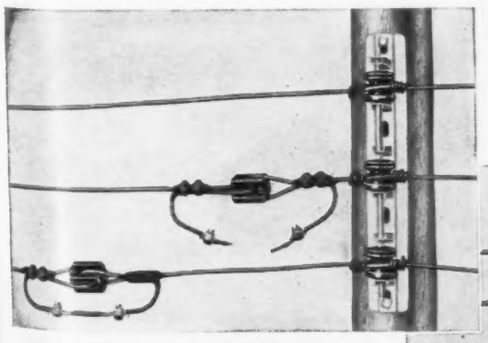
RELIABLE OPERATION

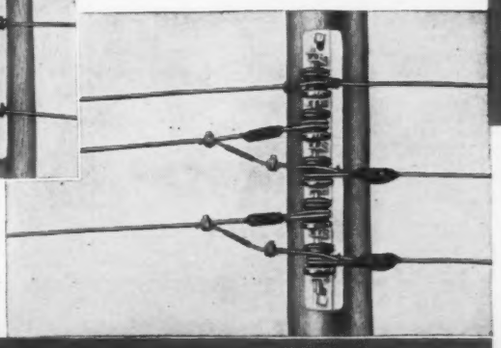
The new G-E secondary fuse has built into it the unexcelled accuracy of all General Electric fuse links, with characteristics based on actual test data, permitting accurate co-ordination of the fuse links with motor-starting currents, with primary or secondary fuse links of other ratings, and with relays. The *fusible element is totally enclosed* in the Textolite tube for protection against weather and to provide permanence of characteristics. A stainless-steel spring assures positive expulsion and indicating action on low overload currents as well as short-circuit currents.

It will pay you to investigate the possibilities of improving service at low cost with this new G-E fuse.

FREE SAMPLE FUSE FOR YOUR INSPECTION

To enable every distribution engineer to see the new G-E secondary fuse without delay, we are offering you the opportunity to obtain a 5-ampere fuse immediately and without cost to you. Get this sample fuse — look it over — note the weatherproof construction — then test it. See for yourself that it gives positive indication even on low overloads. Ask for your sample now. Use the coupon or write on your business stationery. Address General Electric, Dept. 6—201, Schenectady, New York.

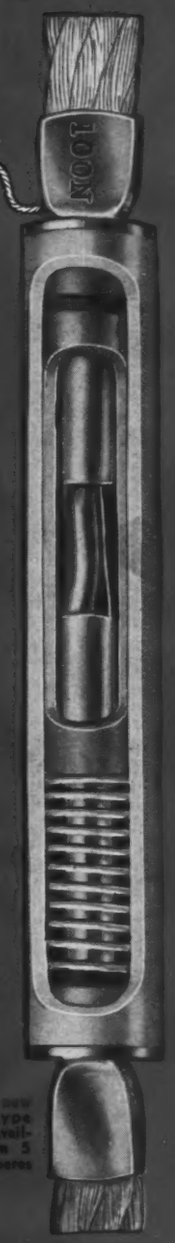




TWO WAYS TO INSTALL

(Left) Where strain insulators are used, the fuse can be installed this way (upper fuse shown indicating)

(Right) The fuse can be installed at the pole without the use of strain insulators



Cutaway view of the new G-E indicating-type secondary fuse. Available in ratings from 5 amperes to 200 amperes inclusive

Send for

FREE SAMPLE

OFFER EXPIRES JULY 18, 1938

GENERAL ELECTRIC

General Electric, Dept. 6X-201
Schenectady, N. Y.

Please send me by return mail free sample of the 5-amp G-E secondary fuse for low-cost protection of secondary circuits also descriptive and application bulletin GEA-2942

Name.....

Firm.....

Address.....

City..... State..... 340-37

Field OPERATING PRACTICES

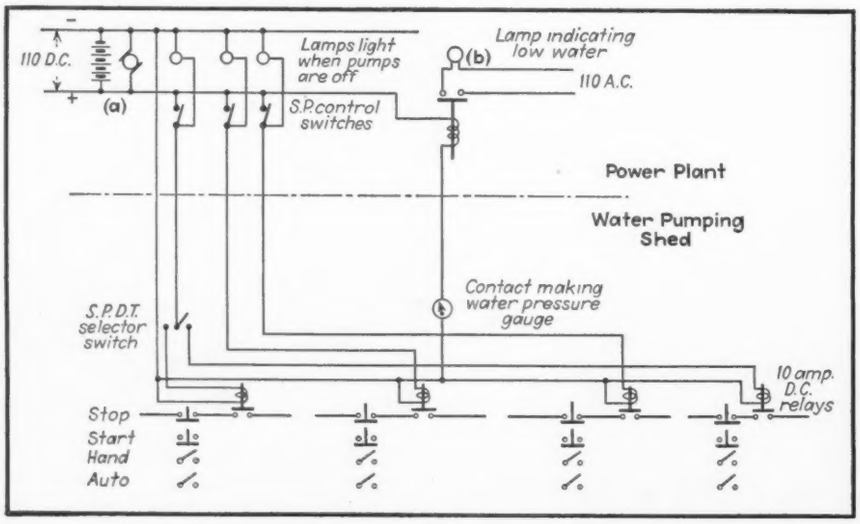
New ideas and practices in the operation of well-designed, constructed and maintained plants and systems

Limit Station Load by Remote Control

A limited degree of control over remotely located village water pumps is exercised by the operator at the municipal generating station, Freeport, Long Island, by means of a d.c. remote-control scheme that permits him to co-ordinate water pumping operations with system load conditions. The control allows the operator to shut down certain pumps at times when their continued operation would make it necessary to put another unit on the line.

The village water pumps are located across town from the generating station. These pumps, when shut down either by the operator at the pumping station or the power plant operator, automatically start up when water pressure falls below a critical value. It frequently happens during peak-load periods that the 355 hp. represented by the four pumps overloads the capacity of the generating units on the line. Rather than start up an extra unit it is convenient to cut off one or more of the water pumps. This can be done safely as long as the water pressure does not fall below the minimum value.

To accomplish this the d.c. remote-control system illustrated was set up on the generator control panel. By operating any of the bank of three switches (a) from one to three of the pump motors in the remote water pumping station may be cut off. When this is done indicating lamps go on and stay on until either the operator opens the closed switch or the water plant operator starts the motor manually. A lamp (b), also on the panel, tells the power plant operator when a dangerously low water pressure has been reached. He then must either overload the generators or put another unit on the line to carry the necessary pumping load.



D.C. remote-control scheme allows power plant operator to limit water pumping load

Operation of the control switches (a) at the power plant shuts down unnecessary water pumps at remotely located pumping shed. Pumps are started up automatically when water pressure becomes dangerously low; lamp (b) lights to warn plant operator to prepare to take oncoming load.

•

Phones Maintained on Force Account

By E. E. GEORGE

Tennessee Electric Power Company, Chattanooga, Tenn.

On power systems of the transmission type, covering considerable territory and serving many towns and cities, the maintenance of communication equipment is sometimes unduly expensive on account of the large number of terminal points and the distances from maintenance headquarters. In most cases where the power company desires to own the terminal communication equipment it would be very advantageous to have the maintenance performed by a local organization.

One of the associated companies of the Bell system has made such arrangements on an experimental basis. One of these arrangements has been in very satisfactory use in this territory for more than two years. Under this arrangement the Telephone Company maintains all power company-owned telephone lines within the city limits (excepting one "hot" line) and all telephone instruments and switching equipment. Maintenance work is done only on an authorization from the power company dispatcher. In

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WITH PYRANOL TRANSFORMERS

You eliminate the expense of a fireproof vault

Because Pyranol is noninflammable and nonexplosive, Pyranol transformers can be installed indoors without a vault.

You reduce power-distribution losses

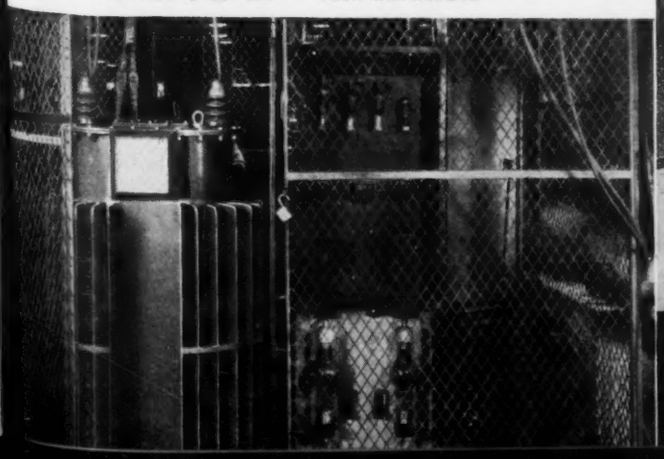
Because Pyranol transformers require no vault, they can be located right at load centers, thus cutting down long runs of secondary copper and minimizing power-distribution losses.

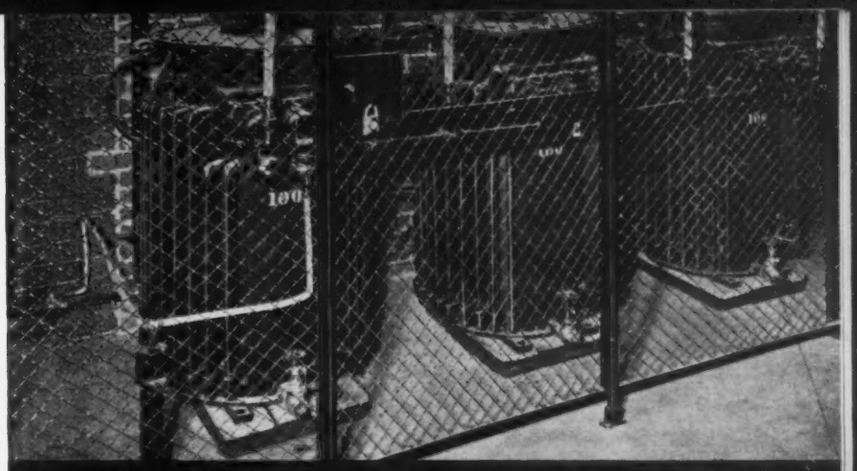
You save on maintenance

Because Pyranol is nonsludging and because Pyranol transformers are built with pressure-tight tanks to prevent evaporation and contamination, maintenance is much less than on oil-filled transformers.

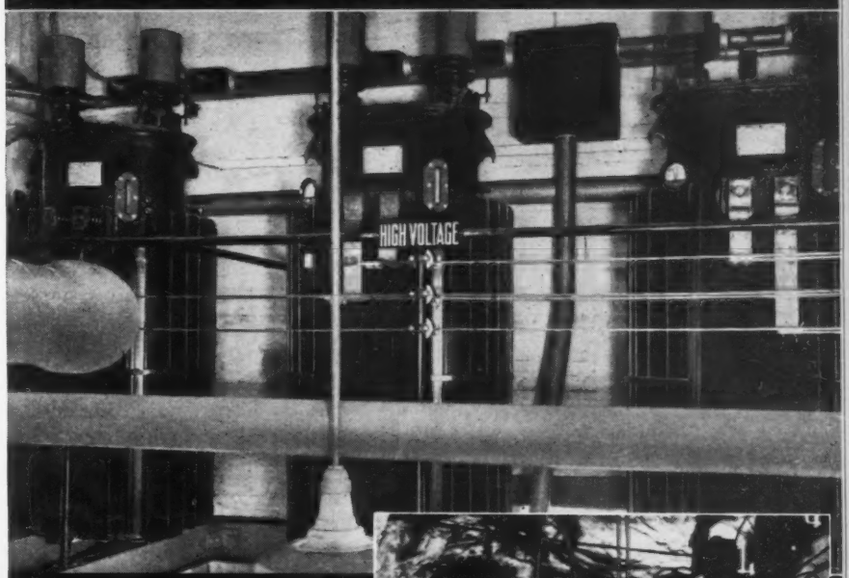
It will pay you to investigate the possibilities of using Pyranol transformers in your plant—particularly if you are considering a new indoor installation. Ask your G-E representive for complete information or write to General Electric, Dept. 6—201, Schenectady, N.Y.

(Below) The Packard Motor Company installed this Pyranol transformer adjacent to a G-E thyratron control equipment for a resistance welder—an application where close proximity to the load is highly desirable. Money was saved because no vault was needed

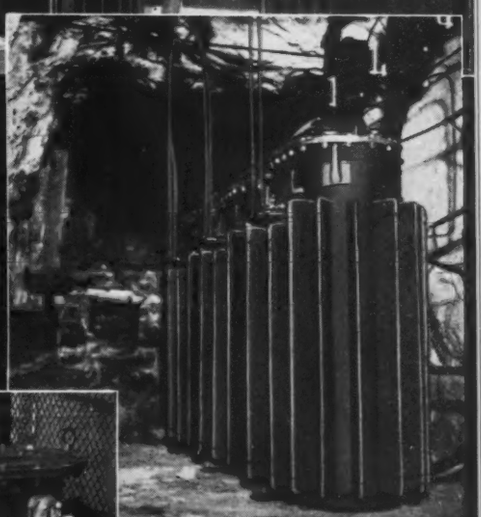




(Above) The Eli Lilly Company, of Indianapolis, made a substantial saving in total installed transformer cost with these Pyranol units, because no vault was required



(Above) By mounting these Pyranol transformers on steel beams above the floor level, Acme Breweries, San Francisco, conserved floor space in its engine room. Savings in installed cost were realized because no vault was necessary



(Above) In mines, where safety comes first, Pyranol transformers make possible substantial reductions in installation expense and power-distribution losses. These Pyranol units are installed 4,000 feet underground in the North Star Mine of the Empire Star Mines, Grass Valley, California

(Left) This Pyranol transformer is installed near a load center on the third floor of the Equitable Building, Des Moines, Iowa, to supply power for an air-conditioning unit installed on that floor

GENERAL ELECTRIC

Filing No. 5100

300-6

the case of "hot" line equipment switches are provided to isolate the terminal equipment for maintenance. If maintenance is required outside of regular hours this is also available at a higher rate on account of calling out telephone employees from home. Individual bills are rendered the power company for such maintenance, covering labor, auto expense, material and overhead.

Because of the fact that the telephone company has a large number of employees in the larger cities and one or more men in every small town it can usually take care of maintenance much quicker and more cheaply than the power company's telephone maintenance forces.

•

Railroad Crane Shifts Structure

An entire two-pole distribution structure was successfully relocated recently by the Nevada California Electric Corporation without dismantling through use of a railroad wrecking boom. The moving job became necessary when a shift in the location of the Santa Fe Railroad tracks required that the pole structure supporting the 300-kva., 2,200/440-volt substation serving the Jameson Packing Plant be moved. The accompanying sequence of pictures shows how the shift was accomplished. Loan of a wrecking boom belonging to the Santa Fe Railroad allowed the job to be done with a considerable saving in cost.

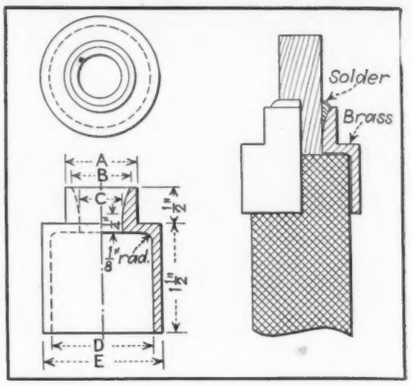
Weatherproof Head for Insulated Cable

By ORIEN A. PENDLETON
Empire District Electric Company,
Joplin, Mo.

In order to obtain better safety and reliability the outdoor buses of small substations carrying 6,600 volts and lower frequently consist of heavily insulated conductors. Many of these conductors must be placed in a vertical position, and from experience we have found that moisture will enter the cable through the strands of the conductor and into any indoor equipment to which it is attached. This condition can be avoided by notching the bottom of the insulation at the low point, but this is very objectionable from a safety viewpoint as the insulation must be notched to the conductor, which not only defeats the purpose of the insulation but accelerates its deterioration.

To overcome these conditions we have devised an inexpensive weather hood to be installed on each cable that could conduct moisture. The stranded conductor is completely filled with solder at and above the top of the weather hood, which is installed as illustrated in the accompanying drawing. If the part of the stranded conductor used for connection to another bus or connector be left unsoldered it is easier handled and makes a better joint. All strands of the cable should be tinned before the hood is installed.

These weather hoods are made of brass and may be either cast and finished or machined from a brass rod. They can be made for approximately $1 each. After a number of tests and several months use on the Empire District system they have proved satisfactory.



Wire Size	Thickness of Insul.	Dimensions A	B	C	D	E
No. 2	3/8"	3/4"	1 1/4"	1"	1 1/4"	1 1/4"
250MCM	1/2"	7/8"	1 3/8"	1 1/8"	1 1/2"	1 1/4"
250MCM	3/8"	7/8"	1 3/8"	1 1/8"	1 1/2"	1 3/4"
No. 2	1/2"	3/4"	1 1/4"	1"	1 1/4"	1 1/4"

Keeps water out of insulated cable

•

Maintenance Set-up for Oil Breakers

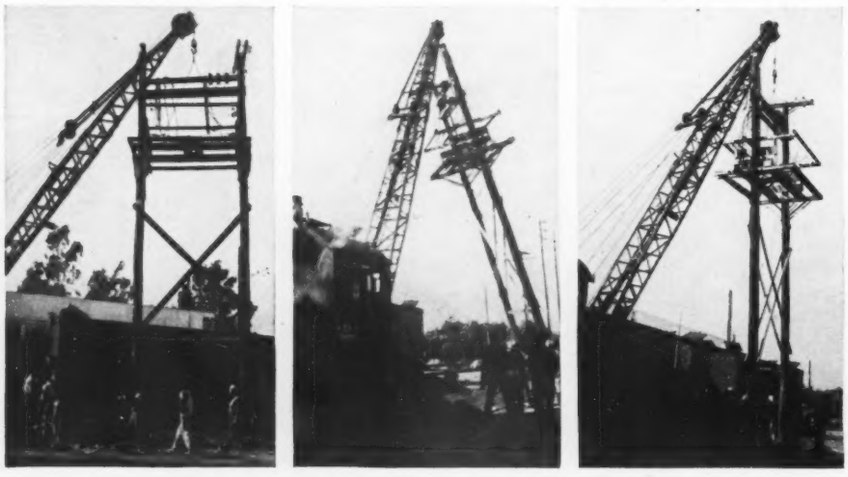
By M. W. BARDWELL
Central New York Power Corporation
Syracuse, N. Y.

Proper and adequate maintenance of oil circuit breakers within commensurate cost limits can best be attained by means of established schedules, tailor-made for each system. The Central New York Power Corporation has obtained the best results from the following schedule:

Oil samples are drawn once a month from the bottom of the tanks of all 110-kv., 66-kv. and 33-kv. outdoor breakers and, where possible, samples are taken once every three months from 13.8-kv., 11-kv., 6.6-kv. and 4.8-kv. outdoor breakers. An effort is made to obtain oil samples after five automatic operations of outdoor breakers and at the time of overhaul of indoor breakers. No oil is considered good unless it will stand up with 22.5 kv. between disks, spaced one-tenth of an inch apart.

All indoor and outdoor station breakers, 110 kv., 66 kv., 33 kv., 13.8 kv., 11 kv. and 6.6 kv., are completely overhauled once a year, or more often if operating conditions require; 4.8-kv., 4-kv. and 2.3-kv. breakers are overhauled every two years, with the exception of a few subjected to severe duty, which have been placed on the yearly schedule.

When overhauling breakers, the oil is drained from the breaker tanks into spare oil tanks or barrels, circulated and filtered in the usual manner. Tanks and linings



Left—Structure clear of the ground at its old location. Center—The structure rests at an angle while the boom is shifted to the other side of the pole. Right—Structure in its new location just before tamping the ground around the poles

are cleaned and any carbon is removed from the rods and crossbars. The breaker contacts are cleaned and filed and the entire operating mechanism is lined up and adjusted to relieve any binding or slippage. If evidence of moisture is found in the breaker, all breaker and bushing gaskets are checked and replaced, if necessary.

Before the oil circuit breaker is put back into service, all breaker bushings are meggered, with the breaker open and with the breaker closed. The latter test gives a check on the lift rods. The breaker electrical control is checked to insure proper opening and closing by hand, and when the automatic relays are tested the breaker is tripped with the relays.

At the time the breaker is overhauled it is timed for three different conditions:

1. "Parting"—the time in cycles from energizing the breaker trip coil until the breaker parts its contacts.
2. "Full Open"—the time from energizing the trip coil until the breaker has completed its opening travel.
3. "Open-Close-Open Cycle"—the time from the making of the breaker contacts, while the breaker is closing, to the parting of the breaker contacts while the breaker is opening, with the trip circuit set up to trip the breaker the instant it is fully closed.

Periodically, once a year, all outdoor breakers 11 kv. or above are Doble tested. Each breaker bushing is tested individually with the breaker open and with the breaker closed. The first test checks the bushings for moisture and early stages of breakdown before failure actually occurs. The second test checks the lift rods.

Secondary Distribution Economics*

II—Voltage Drop and Transformer Size

By E. M. ADKINS
Jersey Central Power & Light Company, Asbury Park, N. J.

The accompanying curves for total secondary circuit length and transformer size vs. load in kilowatts per 1,000 ft. are based on an assumed maximum voltage drop of 3.5 volts per current carrying wire and an average power factor of 90 per cent and are derived from the following equations:

$$\text{Transformer kva} = \frac{EI}{1.5\times1{,}000} =$$

$$\frac{2E}{1{,}500}\sqrt{\frac{DV}{2\times10^3}} = \text{for single phase}$$

$$\text{Transformer kva} = \frac{\sqrt{3}\,EI}{1.5\times1{,}000} =$$

$$\frac{2\sqrt{3}\,E}{1{,}500}\sqrt{\frac{DV}{2\times10^3}} = \text{for three phase}$$

Similar curves may be plotted for other allowable voltage drops by substitution of the proper value of V in the preceding equations.

The factor D used in these equations is equal to the average load density in amperes per 1,000 ft. of secondary circuit at secondary voltage. The value of D may be calculated from the substation feeder load by correcting the feeder load for large blocks of load which is not part of the general secondary system load, reducing to amperes in terms of secondary voltage, multiplying by transformer diversity and dividing by the total length of secondary circuit in thousands of feet. The value of D may also be calculated from the kilowatt-hours delivered. The total kilowatt-hours should be corrected for special power loads and then may be used as shown by the following equation to calculate the value of D:

$$D = \frac{\text{Total Kw.-Hr.}}{8{,}760 \times \text{L.F.}} \times \frac{\text{Transformer Diversity} \times 1{,}000}{\text{P.F.} \times E \times \text{Circuit Length in Ft.}}$$

in which transformer diversity = average diversity for distribution transformers.

8,760 = hours in year.

L.F. = Average primary feeder load factor.

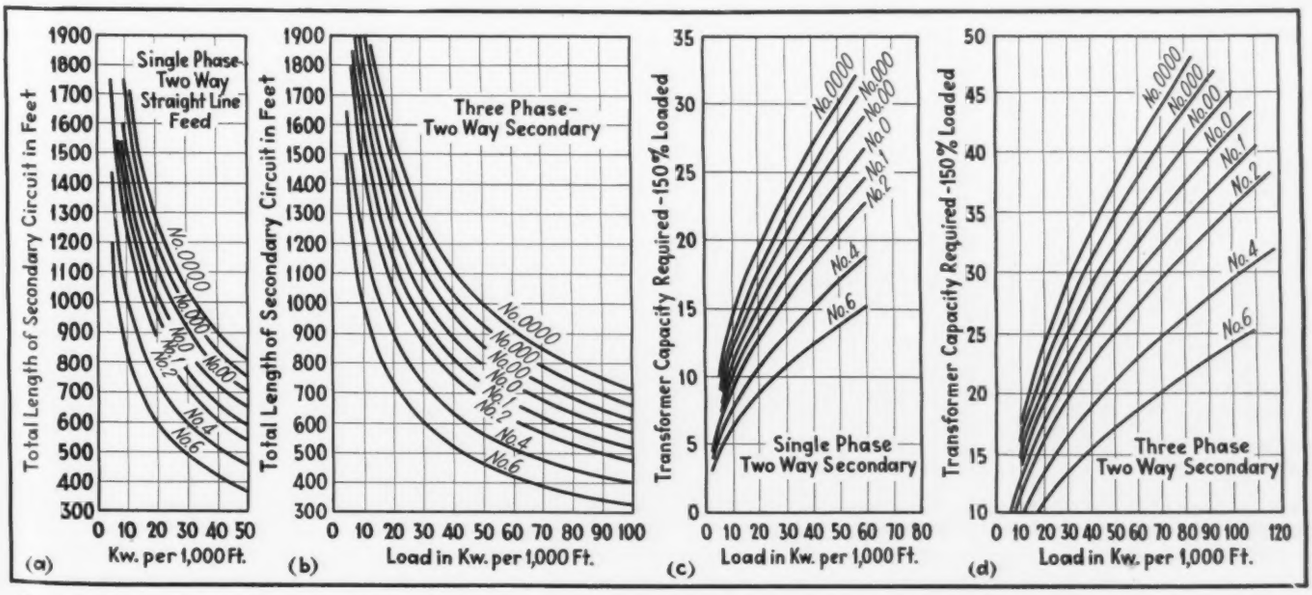
P.F. = Peak load power factor.

E = Secondary voltage—or $\sqrt{3}\,E$ for three-phase secondary.

Circuit length = Total length in feet of secondary circuit.

In general, load density is somewhat greater in urban business districts than in residential districts. It will generally be found advisable to select different copper sizes, transformer sizes, etc., for circuits serving business districts and residential districts. Sometimes these factors will have to be developed separately for business district loading, heavy residential loading and light residential loading.

* Installment No. 5 in a series to continue in forthcoming issues of ELECTRICAL WORLD.



Permissible total secondary circuit length as governed by voltage drop for various combinations of load density and wire size (a and b). Resulting transformer capacity required based on load density, wire size, voltage drop, etc., with transformers loaded to a maximum of 150 percent of rating, (c and d).

New ENGINEERING IDEAS

Discoveries, proposals and developments by electrical engineers and scientists in the field, the factory and the laboratory

Sunlight Affects Energy Output

By **WILLIAM W. SHOMACKER**
Statistical Department,
Commonwealth Edison Company, Chicago.

Studies made in the statistical department of the Commonwealth Edison Company show that three factors affect the output of electricity on any given day: (1) Condition of business on that day, (2) amount of sunlight on the day in question, and (3) the day's mean temperature. If it were possible to remove from output figures the influence of sunlight and temperature the resultant output figure would be in terms of business only and would be of value as an indication of business conditions. This discussion deals only with the effect of sunlight on output; effect of temperature will be treated in a later article.

Weather Bureau records of heat from the sun each day—gram calories per square centimeter—were used as a measure of light per day. Gram calorie records of eleven years were collated to arrive at a "daily normal solar intensity curve (Fig. 1), which shows the normal amount of sunlight to be expected on any day of the year.

People have definite living and working habits that result in different electricity consumption characteristics for each day in the week. To allow for these differences days with similar customer-habit patterns have been grouped together: (a) Sundays, (b) Mondays, (c) Tuesdays, Wednesdays and Thursdays, (d) Fridays and (e) Saturdays. This discussion utilizes only one day, Friday.

With the daily normal solar intensity curve drawn another curve (Fig. 2) can be made relating solar intensity to daily kw.-hr. output. Since the light intensity vs. output curve becomes vertical at the intensity of 650 gm. cal. (so bright that all lights that can be have been turned off) the value of output at this intensity can be equated to 100 per cent and all other outputs corresponding to lower intensities may be expressed as percentages above 100. Such a curve of light intensity vs. per cent variation of output from the base is shown in Fig. 3.

From these curves an equation for output corrected for sunlight from normal is readily deduced:

$$\text{Normal output} = \text{actual output} \times \frac{\text{normal \% of base output}}{\text{actual \% of base output}}$$

Normal output — Total actual output for the day corrected for normal sunlight.
Actual output — Total actual output for the day in question.
Normal per cent of base output — Per cent of base output corresponding to normal solar intensity for the day.
Actual per cent of base output — Per cent of base output corresponding to actual solar intensity for the day.

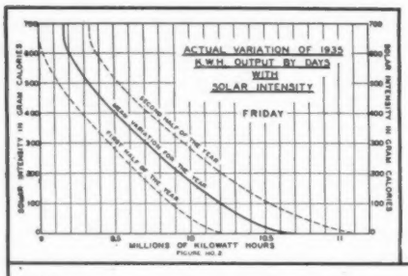


Fig. 2—Variation of output with sunlight in 1935

Because of load growth during the year a mean curve had to be made. This was done by averaging the curves of the two halves of the year.

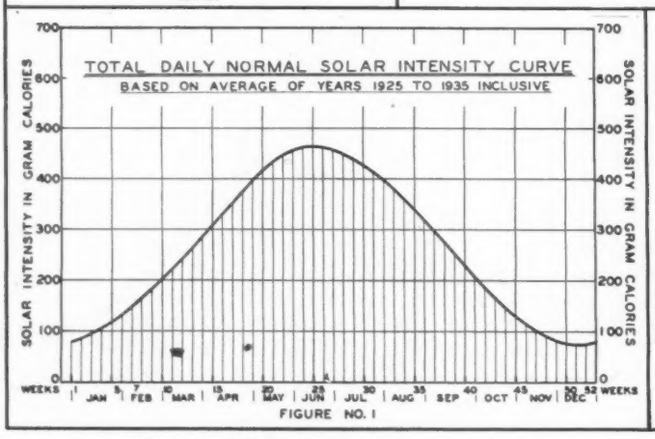


Fig. 1—Daily normal solar intensity

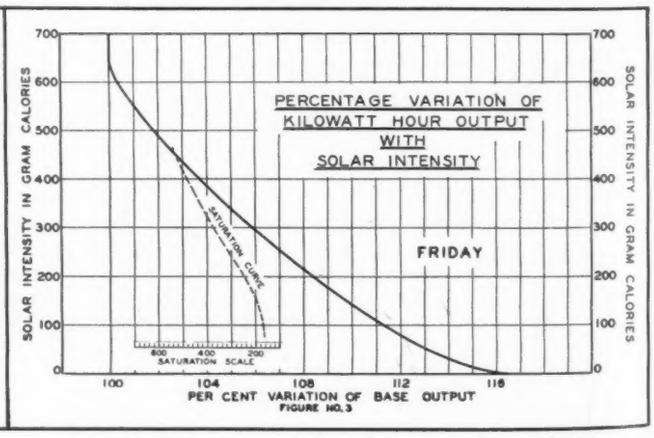
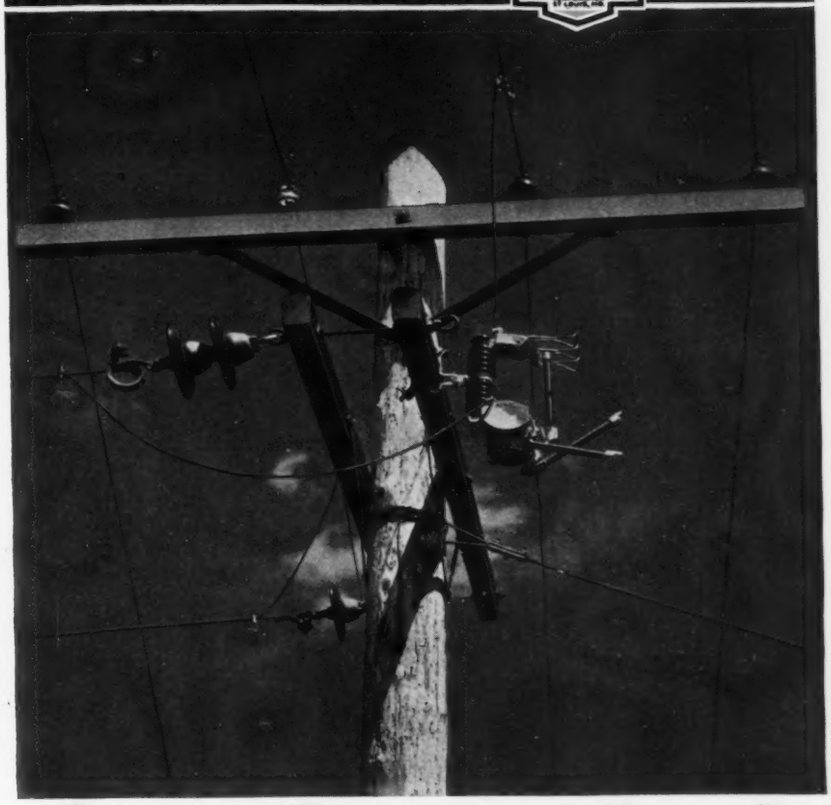


Fig. 3—Per cent variation of output with sunlight

Reduce Operating Costs with JAMES R. KEARNEY ST. LOUIS, MO. Products



"There's another patrol trip we saved . . . that Trip-Saver cartridge, in blown position, shows that it cleared a fault."

Lower Interruption Costs Fewer Long, Hard Patrols

—a mighty good reason for a change to Kearney (Reclosing type) Trip-Savers

You need fuse link accuracy for positive protection. Kearney Quik-Action Fuse Links are accurate—within plus or minus 10% of current values—usually within 5%.

GETTING OUT at all hours of the day and night to take care of service interruptions, at isolated locations in the system, was causing crews a lot of trouble . . . reports showed that long, time-consuming patrols were increasing operating costs — service interruptions were reducing revenues.

An alert engineer studied Kearney Trip-Saver Switches . . . Noted that they could be easily installed; were sturdily built, for lasting service; realized that exclusive design features assured positive performance; that the cycle of operation of the cartridges could be started at any one of the cartridges and that the position of the cartridges showed whether or not there had been trouble.

Here was good reason for a change to Kearney Trip-Savers . . . After they were installed, if a fault or overload occurred, the one cartridge in service cleared the trouble — an auxiliary cartridge restored service within 30 to 40 cycles.

Why not take advantage of the savings that Kearney Trip-Savers effect? Investigate . . . or, have our engineers work with you. Write today.

JAMES R. KEARNEY CORPORATION
4224-42 CLAYTON AVE. **SAINT LOUIS, MO.**

Standardize with

KEARNEY

Products

Due to some unusually high solar intensities it was necessary to determine an additional curve (called a saturation curve) which is used to prevent over-correction on extremely bright days. This curve appears as a dashed line on Fig. 3. Its use is illustrated in the example.

Example:
Date: Friday, March 8, 1935.
Actual output—9,533,000 kw.-hr. (known).
Actual solar intensity—389 gm. cal. (known).
Normal solar intensity—215 gm. cal. (Fig. 1).
Normal per cent of base output—108. (Fig. 3).
Actual per cent of base output—103.95. (Fig. 3).
Normal light and power = $9{,}533{,}000 \times \frac{108}{103.95} = 9{,}904{,}400$ kw.-hr.

This is not correct, however. Reference to the saturation curve (see dotted curve on Fig. 3) shows that the highest value of actual solar intensity that can be used with a normal of 215 is 265 gm. cal., instead of 389. The actual per cent of base output for 265 gm. cal. is 106.71 per cent. Substituting this correct value in the formula, the normal output is—9,658,000 kw.-hr., instead of 9,904,000 kw.-hr.

•

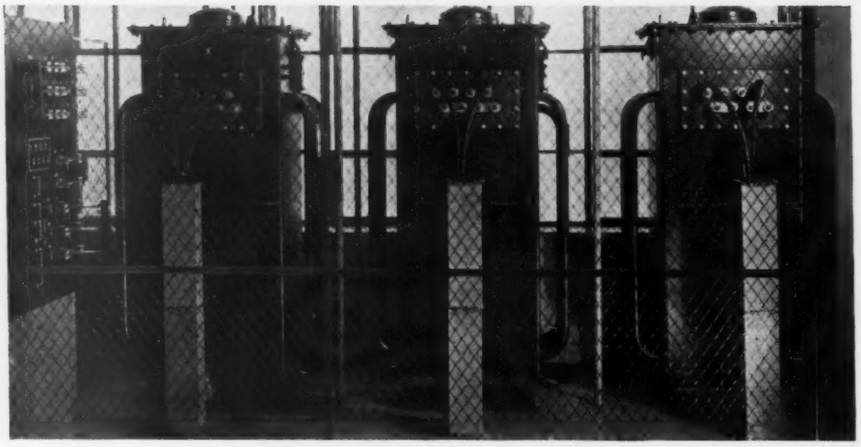
Switching Replaces Link Changing

By W. T. ALLEN
Square D Company, Detroit, Mich.

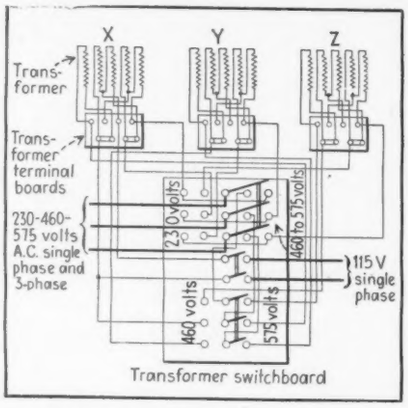
An unusual type of switch on the board controlling transformers that supply test energy to the laboratory of the Square D Company obviates the necessity for changing link positions on the transformer terminal blocks when different test voltages are desired. This switch not only saves time that would otherwise be required for link changing but also avoids de-energizing the transformer bank for safety during voltage changes.

Each transformer is rated at 200 kva. nominal capacity at 575 volts and has a secondary in five sections that can be connected for 115, 230, 460 and 575 volts. Impedance is quite low, approximately 2½ per cent, to provide the 12,000-amp. short circuit capacity available on each phase. Each transformer is provided with the usual terminal block, on which link and stud connections may be made for the different secondary arrangements, and has as well five 2½ per cent primary taps for adjustment to input voltage.

The switching arrangement which allows the link positions to remain unchanged in the straight through series connection of the secondary appears on the accompanying diagram. The unusual switch earlier mentioned is, like the two others, a double-throw device, but has five terminals per phase so that the blade is closed on three in either position. The function of the two terminals on each side of center is to close the corners of the delta secondary connection for 230 volts on one side or, on the other, for 460 or 575 volts.



Quick voltage change switching
Mounted on the transformer case is one of the three terminal blocks whose work is so largely done by the switches at the left. Note the multiple clips on the top switch.



Switches obviate link changes

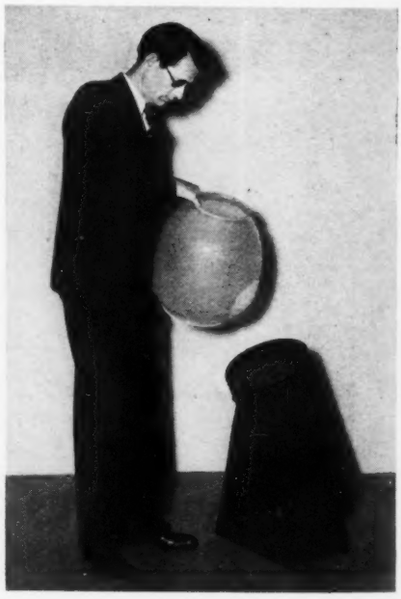
•

A Radioactive Lightning Arrester

A new low-voltage lightning arrester (up to 400 volts), consisting of a discharge gap between two solid iron electrodes and a series resistance inclosed in a glass tube, filled with a gas at a low pressure, together with a radioactive substance, is reported to be the result of considerable investigation and to show extreme rapidity of action. The arrester is a product of Philips Lamps, Ltd., and is reported in a recent issue of *The Engineer*. The radioactive substance is said to be responsible for both rapidity of operation and low dynamic breakdown voltage in the discharge gap. But there is no statement as to what this radioactive substance is, how it functions or how the cost of the arrester and the cost of its maintenance compares with other types.

•

REVEALS STRAINS IN STREET-LIGHT GLOBES



Among the gages and testing devices devised by scientists of the Electrical Testing Laboratories, New York City, to determine the conformity of street lighting glassware to specifications is the illustrated polariscope. This instrument detects the presence of internal strains in the globe wall. The globe is held in the field of plane polarized light supplied by the polariscope and viewed through special polaroid spectacles. Presence of strains is apparent through birefringence. The polariscope consists of a 40-watt incandescent lamp, condensing lens and polarizer (a sheet of polaroid).

LIGHTEST WEIGHT FOR GIVEN STRENGTH . . . *another high spot in*

TODAY'S TREND TOWARD PYREX® POWER INSULATORS

PYREX is a Trade Mark and indicates manufacture by Corning Glass Works, Corning, N. Y.

Industrial ELECTRIFICATION

New ideas and practices in industrial electrification as presented by industrial, consulting and power sales engineers

Process Controls Double Production

Satisfactory dyeing of woolen and worsted goods is generally conceded to be one of the most exacting tasks in textile dyeing. It entails intimate knowledge and accurate control of the initial temperature of the dyeing liquor, its temperature when the goods are entered, gradient and time of temperature rise, temperature and duration of boil and the time and method of feeding dyestuff. If these factors are not controlled according to a mathematically exact schedule the dyemaster is helpless in his efforts to get and to reproduce good results. The resulting waste is considerable.

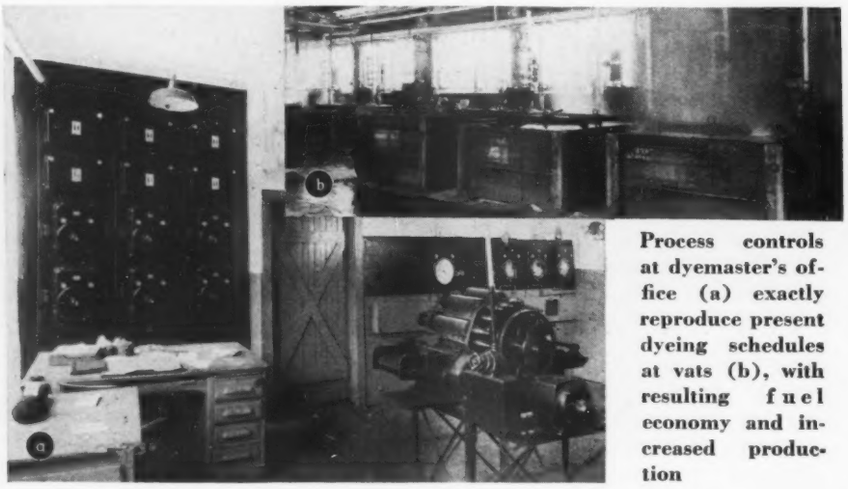
To give the foreman of the dyeing department a means of controlling the entire dyeing operation according to a definite reproducible schedule and to promote fuel economy, the Kent Manufacturing Company, Clifton Heights, Pa., has applied fully automatic electric process cycle control equipment to the operation of its wool dye vats. Use of this equipment has made possible the following specific benefits:

1. Tensile strength of the wool has been increased 17 per cent.
2. Production was stepped up from six runs per vat per day to twelve runs per vat per day.
3. Amount of steam used has been reduced and the pressure dropped from 80 to 40 lb.
4. The dyer can duplicate results accurately.
5. Boiling over of vats has been eliminated, saving color and chrome.
6. It is now possible to get uniform color throughout the batch without assistance of dyer or floor man.

Time temperature cams cut to reproduce the dyeing schedules for various colors are used in the process cycle controller to actuate relays and contactors controlling various apparatus. The control equipment supplied by the Bristol Company, mounted on a panel in the dyemaster's laboratory, permits the dyer to make up the formulas and do the dyeing from the laboratory without being in constant attendance at the vats. Operation of the control is as follows:

When the operator has completed the charging of the vat with from 400 to 700 lb. of wool he presses a button and starts the time-temperature controller operating. Temperature of the dye liquor is brought up to boil according to a definite rate of rise and held for a varying period of time. The controller lights a light to indicate the end of the heating period. When the temperature has dropped sufficiently a red light indicates that the temperature is satisfactory for adding more dye. With the dye added the operator again presses a button and initiates another cycle of temperature rise. This "add dye" cycle brings the batch back to a boil and holds it. At the end of the boiling period a white light comes on and the cooling process follows, again accompanied by a red light when temperature has dropped. Further add dye periods follow until the laboratory test indicates that the proper dye has been attained.

Although it was originally believed that it would take 5 years for the control system to pay for itself, the saving effected in time, steam, dye, labor and waste has led the Kent Manufacturing Company to believe that the equipment will pay for itself in about one year.



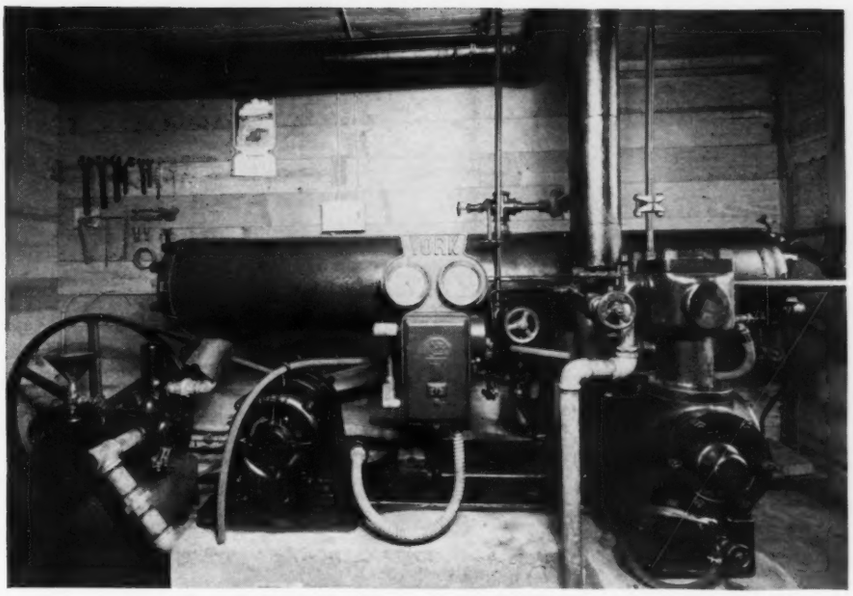
Process controls at dyemaster's office (a) exactly reproduce present dyeing schedules at vats (b), with resulting fuel economy and increased production

•

Apples Bring More When Air Conditioned

Winter storage of apples and consequent loss of satisfactory prices for held-over crops is less of a problem than it used to be, thanks to air conditioning. George Green, an Ashland, Mass., farmer on Boston Edison service, for example, has installed a plant to maintain the temperature of his 10,000-bu. storehouse at about 33 deg. F. from September to March, with a controlled relative humidity of the order of 85 per cent. The storehouse is 60 ft. long x 40 ft. wide x 10 ft. high.

A 10-hp., self-contained ammonia compressor supplies the refrigerant to a conditioning unit located in the



Self-contained ammonia unit for apple storage at Green farm

storehouse. Storehouse air is passed through the conditioner and recirculated by a 3-hp. fan with a capacity of 10,000 cu. ft. per minute. The heat of the conditioner coils is absorbed by water which is pumped to a cooling tower and returned to the conditioner for re-use. The pump is belt-driven from the motor which drives the compressor and has a capacity of 35 gal. per minute. Provision for intake of fresh air and of additional water is made in the duct and piping systems and the coils of the conditioning unit are assembled of 2,000 ft. of ¾-in. galvanized steel pipe, staggered 1.5 in. apart on centers and without fins. This design prevents accumulation of frost and loss of air velocity. The walls of the storehouse section are of 4-in. sheet cork and plaster, with a 2-in. floor of the same construction. The ceiling is of 8-in. granulated cork.

It is estimated that the increase in revenue from apple sales when the market is strong for high quality fruit late in the season will pay for the installation in about ten years. Operating expenses and 15 per cent overhead charges are covered in this statement.

•

Small Welder Stops Costly Warping

In fabricating decorative panels for doors and store fronts the Frauneder Ornamental Iron Works, Oakland, Cal., has for some time employed welding as an economic and efficient means of producing this work. However, it cost $1.50 to straighten each panel after welding was finished. They were using a large welder and the resulting heating warped the panel.

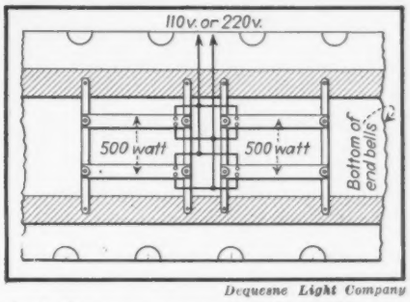
The answer to the problem was to suit the welder to the job and a small mutator welder is now used for this work. Since installing this equipment 350 panels, each one requiring 65 welds, have been produced. Out of the total of more than 22,500 welds made, two failures have been encountered. Warping has been eliminated entirely. The smaller welding set has saved this company $525 to date—more than three times the cost of the equipment. In addition it is claimed that the job can be done 20 per cent faster.

The mutator arc welder, made by General Electric, has also been used on ornamental grill work and in the fabrication of about 168 wire grills. In the former case it has reportedly eliminated 25 per cent of the previously necessary grinding and smoothing.

•

Heaters Protect Motor Windings

During the winter months two large synchronous motors in the plant of the Homestead Ice Company, Pittsburgh, Pa., are shut down. Due to low room temperature, moisture condensing on the motor windings has, on several occasions, caused the insulation to break down when the motors were started up in the spring.



Duquesne Light Company

Strip heaters prevent condensation on moisture on motor windings

Four 500-watt strip heaters installed on the bottom of the motor frames, as shown, heat the windings continuously during cold weather and for about two weeks before the motors are started up. This solution to the problem has eliminated the repair bills, delay and inconvenience formerly experienced.

Oversize welder warped the work—purchased smaller unit—saved $525 to date

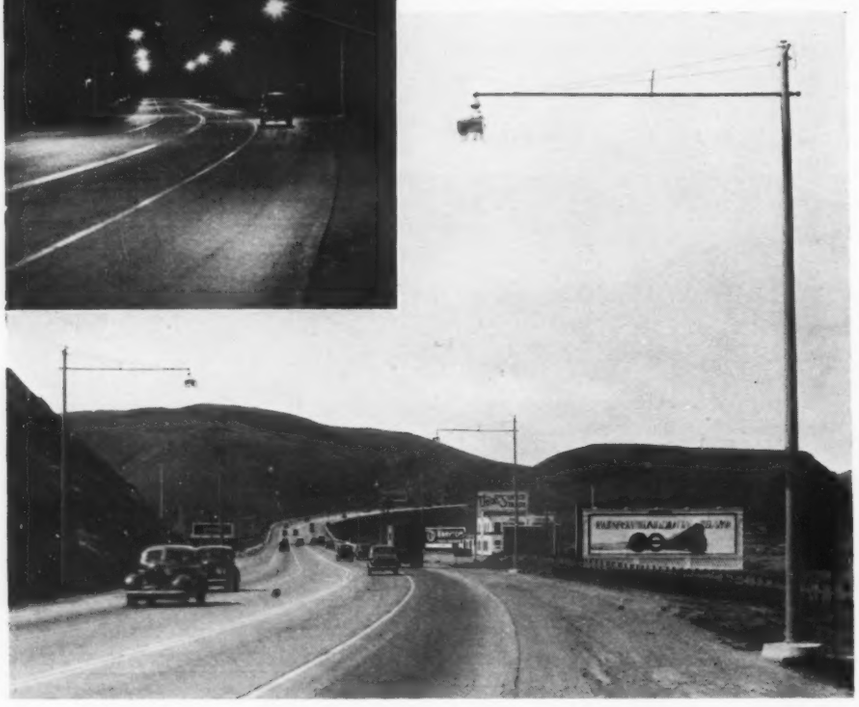
Building Up THE LOAD

New ideas and practices in selling electrical equipment and service to commercial and domestic customers

California to Try Sodium for Safety

The California State Division of Highways has launched a major experiment to determine the life-saving value of new type sodium-vapor lights along a 3½-mile stretch of the Bayshore Highway, heretofore the district's most hazardous night driving thoroughfare.

Studies have disclosed that with a daily travel of from 15,000 to 25,000 cars one-fourth of this traffic is within the dark hours, yet 61 per cent of the accidents occur at night. Of all traffic fatalities on the test stretch 82 per cent are night accidents. This four-lane highway, linking San Francisco with South San Francisco, has been just six times more dangerous at night than during the day.



Stars over California

Man-made stars—141 sodium-vapor lamps mobilize light to reduce the night traffic hazard on a 3½-mile stretch of Bayshore Highway. Before lights were installed by the Westinghouse Electric & Manufacturing Company 82 per cent of the accidents occurred at night on this section of San Francisco's most dangerous suburban thoroughfare.

Completing several months of preliminary tests, 141 sodium luminaires of three types simultaneously flooded the highway with a mellow golden-yellow sodium light.

For the purpose of the experimental installation, three types of lamps are spaced approximately 145 ft. apart on alternate sides of the pavement. They are the "Butterfly" reflector type, the "Airplane" reflector type and the glass-inclosed type, all designed to concentrate the light along the highway and to reduce the discomfort of glare in the motorist's eyes.

F. J. Wellhouse, highway lighting engineer of the Westinghouse Electric & Manufacturing Company, which provided 90 of the new lamps, predicted that this experimental installation will save lives and reduce accidents by illuminating a dangerous condition far enough ahead to permit the driver to see the situation confronting him in time to maneuver his car so as to avoid a collision.

"The light control resulting from these new type lamps," Wellhouse said, "is one of the most important steps yet taken toward safe night driving, because their light flux is maximum pavement brightness for the driver against which objects are seen in silhouette."

•

Duke Power Seeks the "Plus" Sale

There are probably very few domestic users of electric service nowadays who do not have their eye upon another electric appliance, usually a minor appliance. But they

Built for business!

MORE LOAD FOR YOU... MORE TRADE FOR USERS

Choice of 5 different cooking tops.

Heavy steel chrome finish cooking top.

New improved Standard Kalmax and Standard Chromalox enclosed burners... French top or griddle with drain.

Toe space at bottom.

Recessed switches prevent injury from bumping.

Oven vent in back rail allows range to fit flush against wall.

Warmer drawer with roller bearings, easily operated with heavy load.

Two-coat black porcelain enamel finish, including drip pan. Chromium trim.

Heavily insulated porcelain enamel-lined oven with full rounded corners.

Perfectly balanced heat and automatic temperature control.

Pressed-in oven runners, smoothly rounded... no sharp edges.

COMMERCIAL COOKING AT THE PRICE OF A DOMESTIC RANGE.

THE NEW **Standard** OF ELECTRIC COOKERY

● Here is a double-barreled opportunity for profit—every sale builds up continuous day and night load... But in making every sale you can help build business for barbecues, drug stores, wayside stands and other places where food is cooked in the customer's presence. Standard Commercial cooking equipment is designed and priced to suit all needs... Allows you to cash in on public preference for electric cooking and offers the economies of low first cost and continued saving. Here is an opportunity for utilities to make more profits with a line of commercial equipment at the price of domestic ranges... backed by 20 years of experience. Send for complete catalog today or order sample range finished either in black enamel as shown or gleaming three-coat white porcelain enamel. Standard Electric Manufacturing Corporation... Toledo, Ohio.

STANDARD ELECTRIC MANUFACTURING CORPORATION
TOLEDO, OHIO

Please send Standard's catalog and prices on the complete commercial line.

Name_____

Address_____

City_____ State_____

EW 618

just don't seem ever to get the money together to buy the appliance, and yet the price is usually so small that the customer never gets interested enough to ask for time payments.

To meet situations of this nature the Duke Power Company prospectus for the 1938 Range and Water Heater Activity contains the following provision:

"Combination Sales—During this activity other appliances may be added to the electric range or water heater contract, including small appliances. In such cases the prices of the additional appliance or appliances may be added to the contract and the same cash payment and the same terms apply as for the range or water heater."

•

Conditioning Helps Business, Says McLay

Air conditioning has become an important aid to business. Comfort for customers and for employees pays dividends, suggests A. D. McLay of the Detroit Edison Company in an address before the Sales Conference of Edison Electric Institute.

Mr. McLay reports results of a survey which covered every user of air conditioning, both industrial and commercial, in the city of Detroit. Each was asked, "To what extent has air conditioning increased your summer business?" Tabulation of the replies showed the following:

4% said it had increased business 100%
6½% said it had increased business 50%
3% said it had increased business 35%
42% said it had increased business 25%
9½% said it had increased business 20%
3% said it had increased business 15%
22½% said it had increased business 10%

Discussing the advantages which air conditioning had brought them, 97 per cent of these business concerns said that customers had mentioned relief from the heat of the street; 49 per cent considered the elimination of dust and dirt as the chief asset; decreased spoilage and fewer "rejects" were important gains cited by 12 per cent of the concerns, and 38 per cent mentioned the elimination of noise.

The latter advantage, Mr. McLay points out, is one which alone is often worth the cost of air conditioning installation. Noise and dust of city streets can by this means easily be shut out of homes and commercial establishments where values have depreciated because of widened highways, new car lines or other noise or dust annoyances.

"This phase was summed up by the National Resources Committee last year," Mr. McLay says, "in its report on Technological Trends and National Policy. The committee declared that 'Air conditioning, which was first applied in factories for the benefit of the goods, is likely to be extended gradually as it becomes cheaper and as more thought is given to the efficiency and comfort of the worker. With air conditioning will come also better insulation against noise.' "

•

Commercial Cooking Survey Results

Those attractive electric grills and coffee makers and other electric cooking appliances that you see at up-to-date lunch bars and behind drug store counters are becoming increasingly popular. Of total sales of commercial electric cooking equipment reported to the Commercial Electric Cooking Council for 1937, more than 68 per cent were of this type.

The council has completed a survey of sales of commercial electric cooking equipment by means of a questionnaire to electric utility companies. A total of 104 companies replied to the questionnaire, more than twice as many companies as replied to a similar questionnaire a year earlier.

Reasons for the increasing popularity of these commercial appliances are easy to find. The counter men who use them like their convenience, cleanliness and speed. Owners like them because of their economy and because they attract customers. The customers like them because of the excellence of the food when cooked electrically. The increasingly widespread interest in electric cooking in the home is reflected among the public generally by a recognition that electric cooking is modern cooking anywhere.

Activities of the utility companies which replied to the questionnaire indicate that they are responding to this interest. Seventy-six of the 104 companies report that they plan more extensive sales activities in the field of commercial electric cooking during 1938. An even larger number will tie in with the promotional program of the Commercial Electric Cooking Council, which has prepared a Plan Book for dealers and utility companies and two direct mail folders for distribution to customers and prospects. Complete information concerning the Plan Book and folders may be obtained by addressing the council at 420 Lexington Avenue, New York City.

FIRST AID FOR ELECTRIC RANGES

First aid to electric ranges needing spare parts in a hurry is soon at hand when this Boston Edison traveling truck kit goes into action. Systematically stocked in carefully laid out compartments, the required supply items for leading makes of electric ranges are often brought to the customer in a matter of minutes, and if this does not spell friendly relations and sustained use of energy, what could?

Manufacturing AND MARKETS

Electrical Appliance Sales Leveling Off

Sales in the household electrical appliance field have leveled off during April after a sustained upswing in the first quarter, according to C. G. Frantz, president of Apex Electrical Manufacturing Company. Present indications are that current volume will hold.

Business of Apex is holding after good month-to-month gains from the low recession point in January, although still well below volume for the comparable period a year ago. Operations in the washer division are being aided by mail-order house business, which comprises about 40 per cent of the company's total, and volume is sufficient to warrant a night shift for these operations at the Cleveland plant.

Mr. Frantz expects a continuance of this volume in electric washing machines and there are some indications of an increase. Rural electrification programs have not as yet provided the electric household appliance industry with important business. Decline in sales of gasoline-motored automatic washing machines, in anticipation of REA lines, has not been followed by a commensurate increase in sales of electrically operated units.

•

Offers New Price Lists

Delta-Star Electric Company, Chicago, is distributing three new price lists. These are: 8-D, covering outdoor switching and bus support equipment; 9-D, covering indoor bus supports, and 10-D, covering indoor type disconnecting switches. Copies will be mailed on request.

•

Bids for Circuit Breakers

Department of Pubic Works, Sydney, New South Wales, Australia, will receive bids until July 11 for a quantity of 132-kv. and 66-kv. circuit breakers for the Burrinjuck-Port Kembla interconnector system. Sydney County Council is asking bids until August 18 for a compete signal system for the municipal a.c. distribution power substations.

•

Sell $63,900 of Appliances in 24-Hr. Electric Jubilee

Appliance sales totaling $63,900 were reported by 37 dealers and three distributors during a recent 24-hour Electric Jubilee, sponsored by the Electric Association of Kansas City. Included in the total were 74 ranges, 148 refrigerators, 53 washers, eleven water heaters, ten dishwashers, ten garbage disposal units and fourteen beverage coolers.

Besides attempting to sell as many major electrical appliances as possible in a 24-hour period, the activity was designed to prove the value of intensive personal salesmanship and the value of definite evening appointments by salesmen. More than half the sales were made after 6 p.m., it is reported, each salesman being requested to line up two definite evening appointments during the day.

Orders for Air Units Show Decline of 41%

Orders booked for air-conditioning systems and equipment during April as reported by 125 manufacturers, totaled $4,470,192, as against $3,790,040 in March and $6,538,431 in April last year, according to the Department of Commerce. Orders for the first four months were $14,593,476, against $24,832,983 in the same period a year ago, a decrease of about 41 per cent.

Of the total orders booked for April, the air-conditioning group of manufacturers accounted for $2,977,317, against $2,076,279 in March and $3,779,544 in April last year. The fan group accounted for $991,212, against $1,090,808 and $1,857,280, and the unit heater group $501,663, against $622,953 and $901,607.

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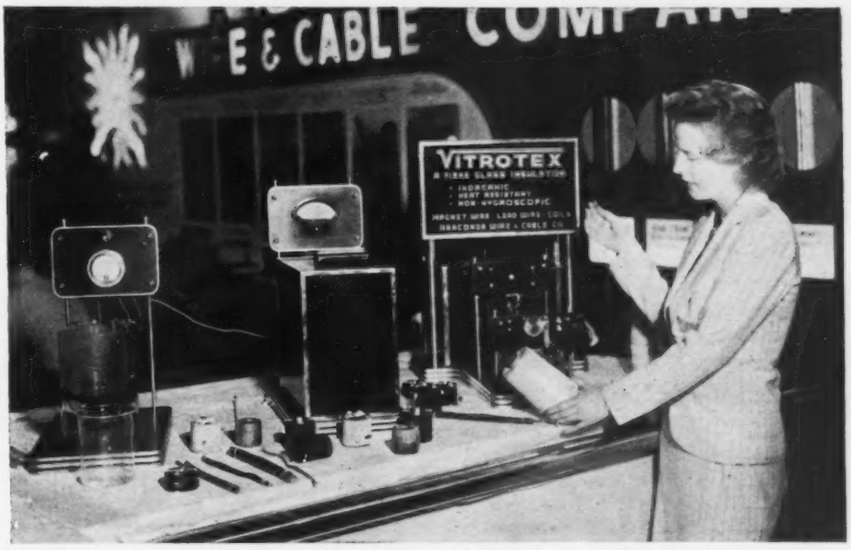
City Board Lets Contract

Water and Light Commission, Menasha, Wis., has awarded contracts for equipment for a new power substation as follows: Transformers and accessories, Wagner Electric Company;



INSULATION—Display at American Mining Congress in Cincinnati by Anaconda Wire & Cable of the practical application of fiber glass insulation, product of Owens-Illinois Glass

substation regulators and auxiliary equipment, and steel building for housing of same, Westinghouse Electric & Manufacturing Company; wire and cable, Graybar Electric Company. Orbison & Orbison, Appleton, Wis., are consulting engineers for the work.

•

Welder Manufacturers Plan Transformer Specifications

Plans for the speedy development of standard transformer specifications were recently approved by members of the Resistance Welder Manufacturers Association.

Walter Anderson, president of the association, has placed A. D. Jardine of the Welding Machines Manufacturing Company in charge of the work. Mr. Jardine will present recommendations at the next meeting of the group, scheduled to be held in Detroit on July 13.

•

Manufacturers Make Sales Assignments

Electrical manufacturing companies have made the following assignments to their sales staffs:

B-L Electric Manufacturing Company, St. Louis, has announced the appointment of Arthur H. Baier as its representative in Cleveland, Ohio. Mr. Baier will cover the state of Ohio and the city of Erie, Pa., in the representation of B-L rectifier products. Samuel K. Macdonald has been appointed representative in Philadelphia. Mr. Macdonald will cover the state of Pennsylvania with the exception of the city of Erie, the states of West Virginia, Virginia, Maryland, Delaware, and the District of Columbia, also the following counties in the state of New Jersey: Burlington, Ocean, Camden, Gloucester, Salem, Cumberland, Atlantic and Cape May.

Proctor Electric Company has added H. D. MacRae to its list of representatives. He will represent the company in the up-state New York territory.

•

Omit Common Dividends

Both the Ohio Brass Company and the Wagner Electric Corporation have omitted the dividend due on common shares at this time. Ohio Brass made a disbursement of 25 cents on this stock on March 24; Wagner Electric disbursed 25 cents per share on March 21.

New York Metal Prices

	June 7, 1938 Cents per Pound	June 14, 1938 Cents per Pound
Copper electrolytic	9.00*	9.00*
Lead Am. S. & R. price	4.00	4.00
Antimony	11.75	11.75
Nickel ingot	35.00	35.00
Zinc spot	4.40	4.40
Tin straits	38.50	39.00
Aluminum, 99 per cent.	20.00	20.00

* Delivered Connecticut Valley.

Field Reports on Business

A substantial stimulation in fall business is expected as a result of the present program of the government to drive its spending-lending funds into consumer channels. This condition has tempered the pessimistic feeling of the summer slump which is being felt in some lines.

NEW YORK

A lot of ground work is being done to put products before prospective purchasers so that when the expected buying wave comes in the fall sales will be easier. Prospects are that the utilities will enter the equipment market on a large scale with an upturn in buying. It is generally felt in business circles that the outpouring of relief money on such a large scale during the next six months will produce a substantial buying wave. As far as effect for the November elections is concerned, it is felt that it will be a success.

One leading electrical manufacturer has ordered all vacations before August 1 so that a full force will be on hand for the expected increase in business at that time. This lead is receiving careful consideration by others who are adjusting schedules to conform.

With an upturn in consumer purchases manufacturers expect a good replacement market to stock outlet shelves. This increase in industrial activity should be reflected in higher power output for the utilities and giving encouragement for reopening of construction programs. The general opinion is that the utilities offer a potentially large demand for central station equipment over the next few years.

The push to the Nash-Kelvinator "sales-mean-jobs" drive opened here this week with a large scale turnout. Dealers see in the plan a chance to move appliances and are getting back of the drive.

NEW ENGLAND

A whiff of invigoration swept through the Boston trade area last week, although a quiet season is expected by many manufacturers pending further reduction of raw material inventories. One leading maker of machinery and supplies reports the best week's business this year, but this situation is exceptional. Several machine tools with individual electric drives, as well as a number of welding outfits, were sold off the floor at a Boston Garden exhibit sponsored by the Austin-Hastings Company of Cambridge, and about 10,000 visitors, including industrial executives and designing engineers from the northeast and middle Atlantic states, displayed keen interest in the show. Westinghouse was scheduled to open its new $500,000 service and storehouse plant in South Boston on the 15th.

Considerable building modernization is under way which will call for good volumes of wiring supplies, lighting equipment, small power and communication facilities. The outlook is good for summer business in oil burner installations for residential use, as well as improved window lighting displays.

Inquiries for wire and cable are slow, with hand-to-mouth orders. Electrical wholesalers are competing sharply for subnormal business, and appliance sales are off for this season, although refrigerators are still being purchased in substantial numbers considering the general state of trade. A wood frame, aluminum conductor transmission line about 18 miles long is under construction between New Bedford and Tremont, Mass., for ultimate operation at 110 kv. under a project to strengthen the Cape & Vineyard Electric Company's service. Distribution transformer sales are continuing on a moderate basis.

CHICAGO

Practically no change occurred in the condition of business during the past week. The few improvements noted in some lines were offset by declines in others. Retail trade moved forward slightly and is currently 18 or 20 per cent under a year ago. The summer lines have been slow to pick up and the moderate rise has been less than seasonal.

Industrial activity continued its several weeks uninterrupted decline, with no rallying tendencies in sight. From present indications it appears that summer will be one of the dullest on record, with prospects that hand-to-mouth buying will prevail until the fall outlook can be calculated. Despite the fact that consumption has been running ahead of production and therefore inventories have been worked down, depression is expected to be pronounced, especially in the steel and automobile industries.

The demand for electrical equipment is following the general trend, with further slackness apparent each week. Orders for industrial equipment are more scattered and of comparatively small amounts. Purchases of substantial volume are confined mostly to PWA awards and other federal-financed projects. There is considerable activity in lighting in store remodeling work and for outdoor athletic fields. Utility buying is slow.

PACIFIC COAST

This June and July are considered critical months and are being analyzed closely because they will reveal whether the usual seasonal let-down will be overcome by what the more optimistic observers consider as new factors, which may round out a fairly good year. Such new factors are FHA residence building; widespread housing planned by such municipalities as San Francisco and Oakland, aided by government loans of $15,000,000 and $8,000,000, respectively; an unusually high amount of school and college construction and rehabilitation during the summer vacation, and a perceptible return of buying confidence through such statewide natural factors as good crops and power line extensions.

Power company purchases are excellent, comprising many carloads of poles, crossarms and hardware for replacements and normal extensions delayed by unfavorable weather. Transformer sales are comparatively low in the smaller stock sizes, due to record snow storage, though accumulated REA installations somewhat restore the balance. Orders include $14,000 capacitors for the Pacific Gas & Electric Company, $20,000 of assorted transformers, meters and cutouts for various central California irrigation companies, 118 transformers and lightning arresters for scattered REA jobs, $6,000 of substation and repair parts for a street railway company and $10,000 of plantation machinery for Hawaiian Islands.

AN INDUSTRIAL POWER USER ASKS!

** AN INDUSTRIAL POWER USER ASKS— "Will you kindly advise whether soil heating cables described in * are available in shorter lengths."

** AN INDUSTRIAL POWER USER ASKS— "Where may we obtain complete technical information and figures on electrical precipitation of dust as mentioned in *"

** AN INDUSTRIAL POWER USER ASKS— "We note on page 7 of your Spring issue of * a device to replace old lamps. Where may we purchase such a device."

** AN INDUSTRIAL POWER USER ASKS— "We would like to know where to get additional information on the subject as outlined in attached * clipping.

** AN INDUSTRIAL POWER USER ASKS— "If possible please send us more information regarding the galvanizing process as mentioned in your * Vol. 2. Pg. 24."

** AN INDUSTRIAL POWER USER ASKS— "We will be pleased to have you send us information on the application of the electric eye for measuring turbidity in water as listed on page 18 of last issue of *"

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News ABOUT PEOPLE

I.E.S. Elects D. W. Atwater of Westinghouse President

The Illuminating Engineering Society announced at its meeting last week at Briarcliff Lodge, Briarcliff Manor, N. Y., the election of DeNyse W. Atwater, manager of commercial

engineering of the lamp division of the Westinghouse Electric & Manufacturing Company, as president of the society for the year beginning October 1.

Mr. Atwater is well known in the field of illumination. In 1926 he played a major role in adapting colored floodlighting to a world's fair for the first time, when the buildings at the Philadelphia Sesquicentennial Exposition and many of the city's historic landmarks were illuminated in striking tones. Again, at A Century of Progress Exposition in Chicago, Mr. Atwater co-operated in the spectacular initial use of colored floodlighting on colored buildings. In 1923 he lighted Pennsylvania Avenue in Washington for the Shriners' convention and in 1924, at the special request of the Democratic national committee, he illuminated Fifth Avenue in New York City for the Democratic convention.

Mr. Atwater joined what was then the Westinghouse Lamp Company in 1920, became assistant manager of the commercial engineering department in 1933, and manager the following year. Long active in the I.E.S., Mr. Atwater was for three years its general secretary, and has served as chairman of various committees. He served for two years as chairman of the illuminating group of the New York section of the A.I.E.E. and is now a member of the committee on production and application of light. Mr. Atwater has actively fostered the use of incandescent lamps for indirect lighting in the home and was one of the pioneers in the I.E.S. certified lamp program.

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▶ THOMAS N. MCCARTER, president of the Public Service Corporation of New Jersey, was awarded the honorary degree of doctor of laws at the recent annual commencement of the University of Newark.

▶ WILLIAM C. MORRIS, vice-president of the Consolidated Edison Company of New York, was elected a member of the board of trustees of the Stevens Institute of Technology at the recent annual pre-commencement meeting of the board.

▶ JAMES G. PATTERSON, engineer of transmission and protection, New England Telephone & Telegraph Company, has been elected chairman of the Boston section of the A.I.E.E. for the year 1938-39. J. C. BALSBAUGH, associate professor of electric power production and distribution, Massachusetts Institute of Technology, becomes vice-chairman, and JOHN M. MURRAY, electrical engineer Simplex Wire & Cable Company, Cambridge, will again serve as secretary-treasurer.

▶ HARMON V. D'AGOSTINO has been appointed eastern manager for Designers for Industry, Inc., product designers, according to an announcement by President Charles H. Oppenheimer of Cleveland. His headquarters will be in the company's New York office. He was formerly associated with the Philadelphia Electric Company, and later operated as lighting and design consultant specializing in commercial and institutional lighting.

Dr. Bush Made President of Carnegie Institution

Dr. Vannevar Bush, vice-president and dean of engineering of the Massachusetts Institute of Technology since 1932, has been elected president of the Carnegie Institution of Washington. Dr. Bush is expected to continue his duties as vice-president of M.I.T. until next January, when he will take office as head of the great research organization founded by Andrew Carnegie in 1902.

Dr. Bush is noted for his achievements in electrical research and contributions to technical education. He has long been interested in the design of analyzing instruments and is internationally known for his achievements in this field. He was awarded the 1935 Lamme Medal of the American Institute of Electrical Engineers for

his development of methods and devices for application of mathematical analysis to problems in the electrical engineering field.

He was invited to join the faculty of M.I.T. in 1919 and his appointment as vice-president and dean of the school of engineering was announced in 1932. For many years Dr. Bush has been active in the A.I.E.E., of which he is a fellow. He is the author of "Operational Circuit Analysis" and the joint author with Prof. W. H. Timbie

of "Principles of Electrical Engineering," one of the most widely used books in the field.

In commenting on the appointment of Dean Bush, Dr. Karl T. Compton, president of M.I.T., said: "Dean Bush is so eminently qualified for his new position, and the post is of such great influence and opportunity in the field of science and human welfare, that his colleagues at Technology are unanimous in their approval of his selection. As they feel pride in his recognition and satisfaction in his enlarged new opportunities, they nevertheless will sadly miss his keen and ever constructive counsel and direction."

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Moreland Appointed Dean of Engineering at M.I.T.

Professor Edward L. Moreland, head of the electrical engineering department of the Massachusetts Institute of

Technology, has been appointed dean of engineering, succeeding to the position which Dr. Vannevar Bush has held since 1932. Following the completion of his technical studies at M.I.T. in 1908, he entered the Boston engineering firm of D. C. and William B. Jackson, which in 1919 became the firm of Jackson & Moreland. The firm has directed many important engineering projects, done a large amount of work for public utility commissioners, municipalities and other public bodies.

In the industrial field Mr. Moreland has had wide experience in the development of both steam and electric power plants. The firm has made extensive studies on the development of power and its transmission in connection with large projects in Canada and the United States. His appointment as head of the department of electrical engineering at M.I.T. came when he was chosen to succeed Prof. Dugald C. Jackson, who retired in June, 1935.

As a fellow of the A.I.E.E. Mr. Moreland has served on many of its

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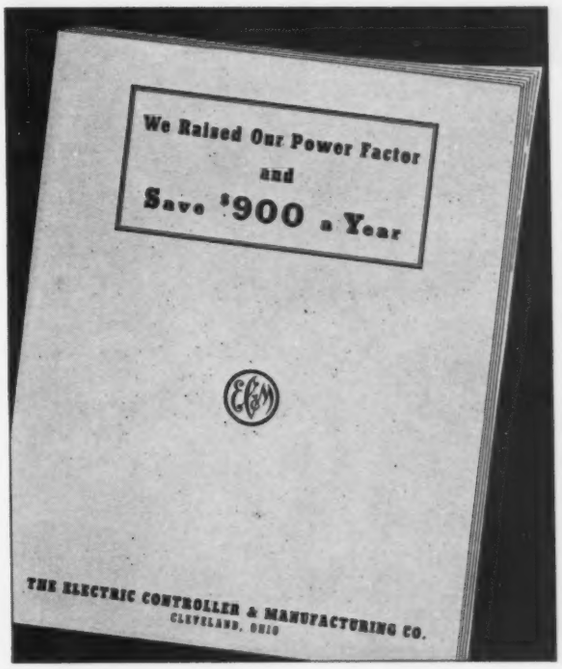

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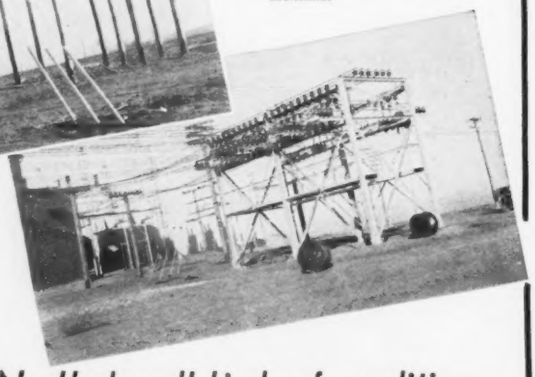
• Wood Pole Structure for 6600 v distribution system forming a turn of ninety degrees.

• Steel Switching Tower erected at Fort Peck, Montana.

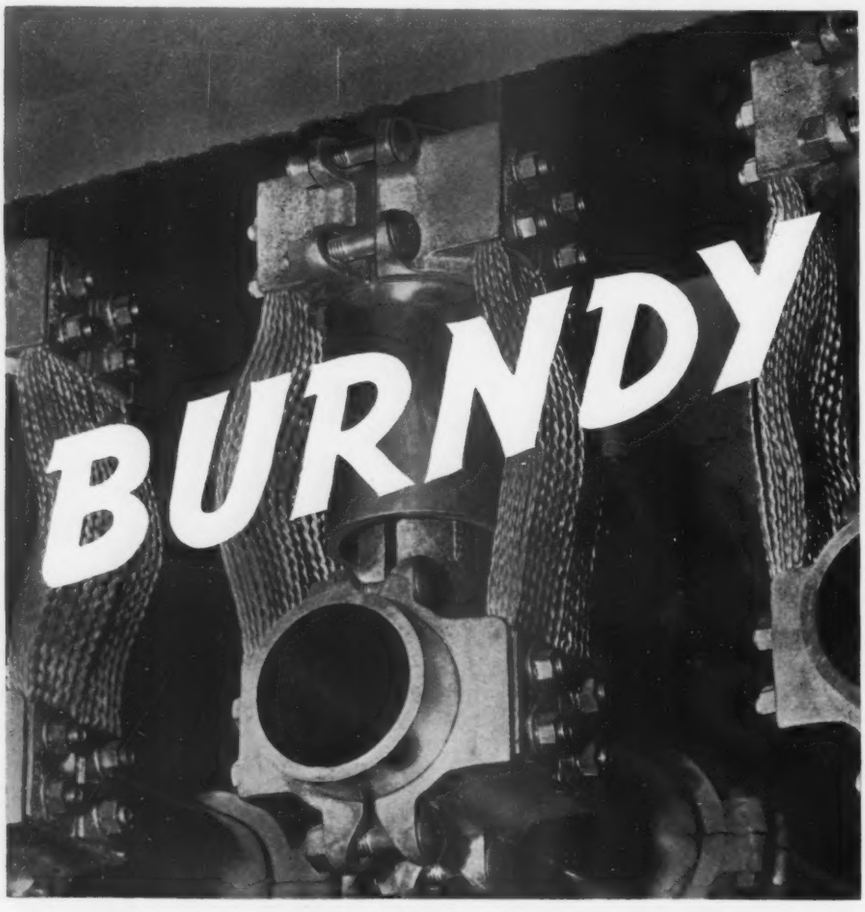


EXPERTS ON NEW CONSTRUCTION *Under all kinds of conditions*

A. S. SCHULMAN ELECTRIC COMPANY
537 S. Dearborn Street
CHICAGO, ILL.
FOUNDED 1890

• The Schulman organization of erection specialists has had more than 50 years of experience in power line rehabilitation and construction projects. Trained crews and modern equipment for low-cost construction, in the quickest time, are immediately available. Let us submit quotations and consult with you on your next requirements.

STEEL TOWER • • • WOOD POLE LINE CONSTRUCTION
SWITCHING STRUCTURES • SUBSTATIONS • POWER HOUSES



committees. He is also active in the American Standards Association, representing the A.I.E.E. on the Standards Council, the sectional committee on standardization of mercury-arc rectifiers, of which he is chairman, and the American advisory committee to the International Electrotechnical Commission on electric traction equipment.

•

F. R. Speer Named Chairman of Great Lakes Power Club

Frank R. Speer was elected chairman of the Great Lakes Power Club at the spring meeting held recently in Chicago. Mr. Speer is supervising power engineer of the Indiana & Michigan Electric Company, South Bend,

Ind. His fifteen years' experience in the power sales field includes employment after graduation from Cornell University with the Scranton (Pa.) Electric Company, Atlantic City Electric Company and Ohio Power Company previous to his present connection.

A. R. Barr, Central Illinois Light Company, was advanced to the vice-chairmanship from the office of secretary and E. A. Allen, Detroit Edison Company, was named secretary.

•

▶ CHARLES B. HAWLEY of Washington, D. C., was awarded the honorary degree of doctor of engineering at the annual commencement of the Case School of Applied Science in Cleveland, Ohio. A graduate of the Case School, Mr. Hawley joined the staff of the Fargo Engineering Company of Jackson, Mich., in 1912 on the design and construction of numerous hydro-electric plants for the chemical industries and power companies in the western states. Two years later he became associated with the Aluminum Company of America and played an important part in the hydro-electric developments of the company in the south

and southeast. Since 1920 he has been a consulting engineer and president of Charles B. Hawley Company, Washington, D. C.

▶C. B. JARVIS, Jarvis Electric & Refrigeration Company, was elected president of the Vancouver Electrical Association at the recent annual meeting. Mr. Jarvis has been vice-president of the association and editor of its official journal, *The Electric Eye*, for the past year, and has also served in other executive capacities for the association.

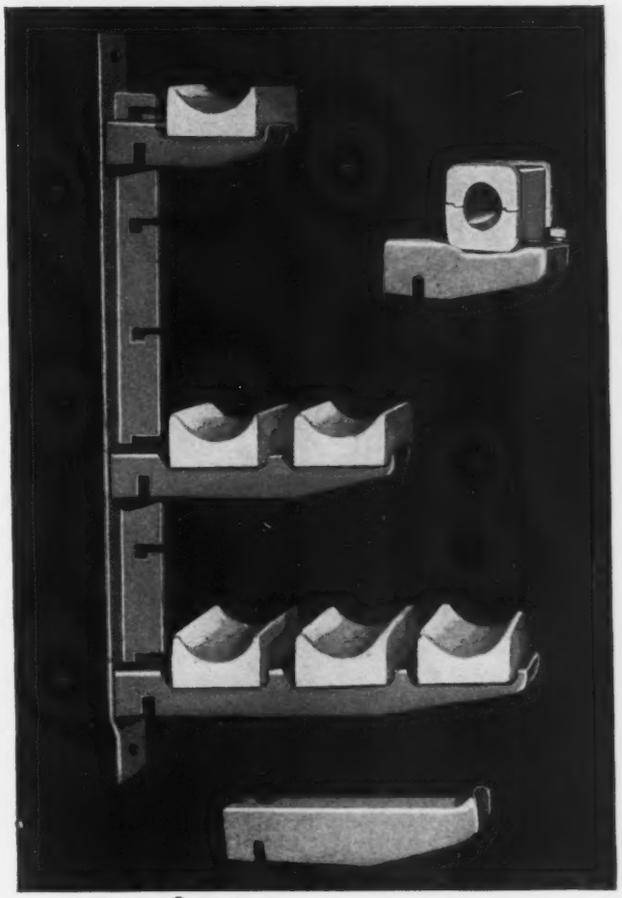
▶A. J. KOETSIER has been appointed superintendent of the Micarta division of the Westinghouse Electric & Manufacturing Company at Trafford, Pa., to succeed A. J. Bastian, who has been assigned to special duties in connection with the promotion of Micarta products through service channels.

▶FRED S. KINSEY has been appointed manager of the northeastern district of the Westinghouse Lamp Division, Westinghouse Electric & Manufacturing Company, with headquarters in New York City. Mr. Kinsey joined the Westinghouse organization twenty-one years ago.

▶JOHN A. COE, president of the American Brass Company, was elected president of the Copper and Brass Mill Products Association at the recent annual meeting at Hot Springs, Va. Vice-presidents named were: R. E. Day, Bridgeport Brass Company; Wylie Brown, Phelps Dodge Copper Products Corporation; and R. L. Coe, Chase Brass & Copper Company. C. D. Dallas of Revere Copper & Brass, Inc., was elected treasurer and T. E. Veltfort secretary.

▶GEORGE D. HARTLEY has opened consulting engineering offices in Worcester, Mass., for general consultation purposes upon problems relating to inventions and patents, experimental and development work, plant and shop surveys, designing and building equipment and machines, management and sales, domestic and foreign. With the late Frank H. Sleeper, Mr. Hartley organized the firm of Sleeper & Hartley of Worcester and was for many years treasurer, general manager and sales manager of that company. Previously he had been actively associated for many years with a wide range of industrial and mechanical work in the United States and Canada. Since his retirement from Sleeper & Hartley, in 1936, he has traveled extensively abroad, visiting many plants and investigating industrial conditions.

Convenience Counts
in
UNDERGROUND CONSTRUCTION



THAT IS WHY THE DEPENDABLE "600" CABLE RACK SHOULD BE USED ON YOUR JOB

Rugged—Made of high grade steel and thoroly galvanized for durable service.

Simple to Install—Simplicity of design permits easy and quick installation. Supports are easily attached to the rack and require no accessory parts nor tools for mounting.

Convenience During Repairs—Only 7/16 inch vertical clearance is required for removal of the complete arm and insulator assembly.

Economical—Interchangeable supports make it readily adaptable to varied construction requirements.

A complete line of Underground, Transmission, Distribution and Street Lighting Equipment is listed in our Catalog No. 37

UTILITIES SERVICE CO.
ALLENTOWN, PA.

New EQUIPMENT AVAILABLE

Arc Length Monitor

To provide control over arc length, as well as to train operators more easily to hold the correct arc length, is the purpose of this electronic arc length monitor, as it is called. Two flashlight bulbs in the

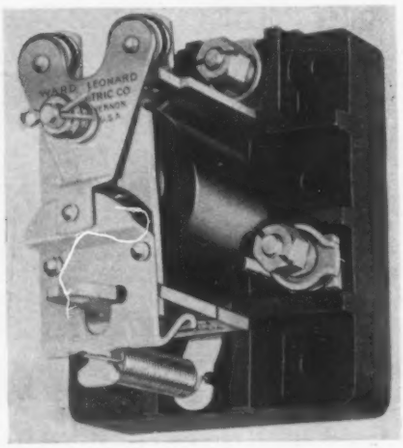
Electronic arc length monitor; power consumption 60 watts; requires 110 volts a.c. for amplifier tubes; range of welding voltages, 20-50 volts. Made by **Raytheon Mfg. Co.**; distributed by **A. O. Smith Corp.**, Milwaukee, Wis.

operator's welding helmet are connected to the monitor itself which in turn is connected across the arc in the manner of a voltmeter and is also plugged in on a 110-volt a.c. line. Dial on the monitor is set at a certain value of voltage; should the operator deviate from this value either up or down, one or the other of the bulbs begins to glow, the glow getting brighter as the deviation becomes greater. The corresponding set of bulbs on the monitor, acting in the same manner, tell the foreman or supervisor how well the operator can hold a steady arc.

•

Magnetic Relays

This company is now marketing the heavy-duty midget relay shown. Relays are furnished with extra large silver-to-silver contracts to provide a maximum contact rating of 10 amp. up to 125 volts a.c.; 10 amp. up to 22 volts d.c., or 2 amp. from 23 to 125 volts d.c. They are available only with single-pole, double-break, normally open contacts.

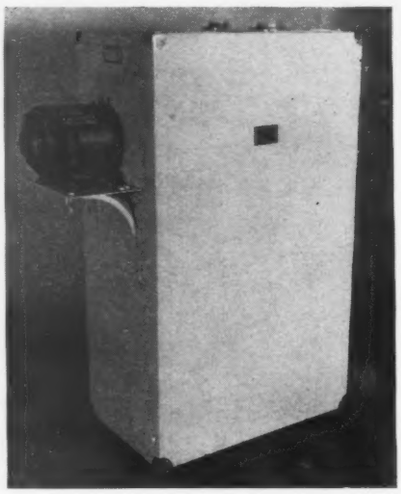


Heavy-duty midget relays. **Ward Leonard Electric Co.**, Mount Vernon, N. Y.

•

Substation Dehumidifyer

A dehumidifyer for use in automatic substations is designed to eliminate the trouble resulting from condensation of moisture on floors, walls, ceilings and equipment. Dehumidification is chemically accomplished; device automatically controls humidity at proper degree. No heating or cooling is required and ducts are unnecessary.



Dehumidifyer for substation use; regularly made for rooms of 1,800 to 60,000 cu.ft. volume. **Royal Electric Mfg. Co.**, 619-621 E. 40th Street, Chicago, Ill.

•

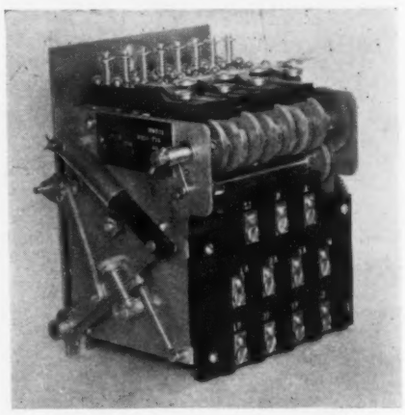
A.C. Voltmeters

"Model 433" portable, multi-range a.c. voltmeters. **Weston Electrical Instrument Corp.**, Newark, N. J.

Improved temperature compensation is now provided on these portable, multi-range a.c. voltmeters. Improvement should be of particular benefit in field test work by public utilities, where temperatures ranging from —20 deg. to 120 deg. F. may be encountered. Instruments of the double-range type (300/150 volts) and the triple-range type (600/300/150 volts) are available with the improved compensation which holds temperature errors to 1 per cent for 60 deg. C. on the lower ranges and to 1 per cent for 240 deg. C. on the 600-volt range. Switches are used for range-changing purposes.

Instantaneous Reset Timer

A new timer for one or more circuits is a synchronous motor-driven time delay relay designed for applications which do not require frequent adjustments of timing intervals, visible indication of timing adjustments not being provided. It is



"Polyflex" reset timer; standard models for use on 110-volt, 50-60-cycle a.c.; motor rating, 85 milliamp., 5 watts; cycle ranges from five seconds to five minutes, to ten seconds to ten minutes. **Eagle Signal Corp.**, Moline, Ill.

said to be particularly suited to those installations where a timing interval between the functioning of two or more contacts is required. Timer may be adjusted in the field to provide timing sequences with clutch coil energized in which case it starts timing when control circuit is closed, or with clutch coil de-energized, starting timing when control circuit is opened. Typical uses include its application to motors, deep-well pumps, automatic doors, solenoid valves.

•

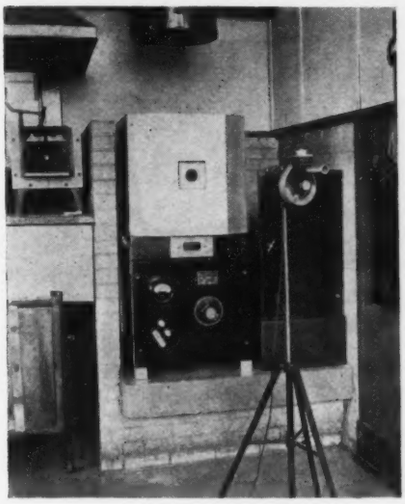
Guy Anchor

Designed for power line anchorage, this guy anchor has beads inside the cone to strengthen the anchor and square segments that lock the nut on the guy rod.

"Murray" Earth Cone Guy Anchor; made of cast iron, in various sizes to meet requirements. **D. J. Murray Mfg. Co.**, Wausau, Wis.

Electric Tube Furnace

New electric furnace uses the "Globar" tubular element; in this application objects to be heated are placed inside the heating element, thus providing a more uniform heat. The illustration shows the furnace used for ash fusion determination;



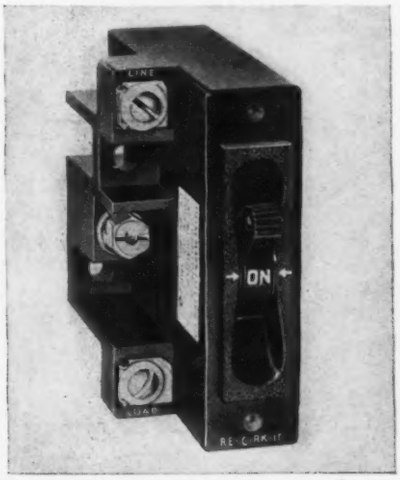
High-temperature electric tube furnace; will operate up to 2,800 deg. F.; can be brought to operating temperatures in 45 minutes, if necessary. **Harper Electric Furnace Corp.**, Niagara Falls, New York.

furnace proper is placed on a stand housing the transformer and controls. Controls are located below the furnace, allowing the operator to adjust the temperature, by varying power input, while observing the material being heated. On the panelboard are mounted a circuit breaker, wattmeter, voltage control knob and transformer tap-changing posts. About 4.7 kw. is required, it is said, to maintain a temperature of 2,800 deg. F. with the ends of tube open.

•

Auxiliary Breaker

Said to be the first fully electromagnetic motor-control device, this small, compact circuit breaker is designed for fractional-horsepower motors up to 1 hp., in ratings



"Re-Cirk-It" auxiliary breaker. **Heinemann Electric Co.**, Trenton, N. J.

from 250 milliamp. to 35 amp. A magnetic time-delay unit takes care of harmless overloads, while the breaker opens instantaneously on heavy overloads and short circuits. Magnetic blowout contacts

INSULATION HEADQUARTERS

With cover removed, you see above the new 100 ampere frame ITELITE Thermal Circuit Breaker. Arrows point to the insulated housing for the arc quenching chamber, a simple, inexpensive and highly efficient shield of 3 DIAMOND FIBRE stampings of ingenious design. DIAMOND FIBRE has the necessary combination of mechanical strength and arc quenching characteristics thereby giving improved performance and lower cost. DIAMOND FIBRE can no doubt be used to advantage in YOUR product.

CONTINENTAL-DIAMOND FIBRE CO.

NEWARK, DELAWARE

Represented in Canada by Diamond State Fibre Co. of Canada, Ltd., Toronto

"Worth Its Weight in Gold!"

"Super-Meg" Insulation Tester

"Megger" Tester saved $2500 on a single rewinding job.

Harry Mc——* operates a 975-kva hydro plant which furnishes power to a city in Virginia. One day while making a periodic "Megger" test on one of his 300-kw. machines, he noticed that the insulation resistance had dropped from over 100 megohms to about 30. A month later the "Megger" test showed 6 megohms—still good insulation, to be sure, but a clear indication that something was wrong.

An examination of the generator revealed a defective coil which was replaced—without burnout, without any interruption to service, and without rewinding the whole machine—a clear saving estimated at not less than $2,500.

In Mr. Mc——'s own words:—"I think this one instance is enough to show that your 'Megger' is 'worth its weight in gold.' I wouldn't part with it for any price, if another could not be had."

A "Megger" instrument is good insurance! What is it costing you to be without one? Write for descriptive "Megger" Catalog 1550-W.

JAMES G. BIDDLE CO.

ELECTRICAL INSTRUMENTS

1211-13 ARCH STREET PHILADELPHIA, PA.

*Name and address on request

will withstand short circuits and reduce arcing to a minimum, it is claimed. Tumbler-type handle moves one way to close, other to open and indicate "on" and "off."

•

Lamp Transformer

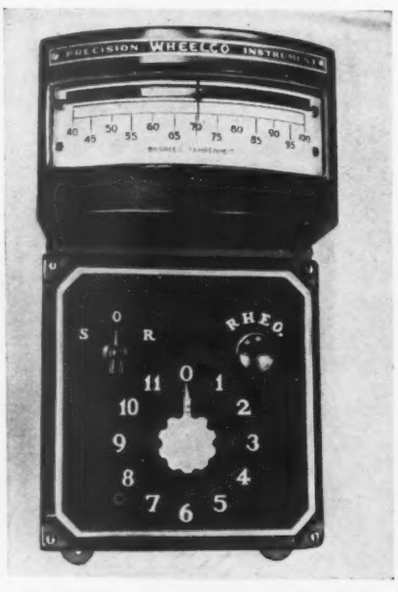
New double-duty transformer is designed to operate two 400-watt type H mercury lamps at peak efficiency and at 90-95 per cent power factor. Use of the new unit is said to permit a reduction of some 20 per cent in transformer costs; transformer losses are reduced 30 per cent in comparison with two single-lamp units, it is claimed. Using the new unit, one lamp starts and reaches its full efficiency before the other lamp. Starting currents using these transformers are said to be below the normal operating current, so that no provision need be made in the wiring to take care of excess starting values.

"Tulamp" transformer; 1½-in. wider and somewhat heavier than single-lamp transformer. **General Electric Vapor Lamp Co.**, Hoboken, N. J.

•

Resistance Thermometers

New indicating resistance thermometers are designed for measuring low temperatures such as are encountered in the air-conditioning field and other industrial applications. They may be equipped with a multiple switch for connecting up to 21 bulbs located at as many different points.

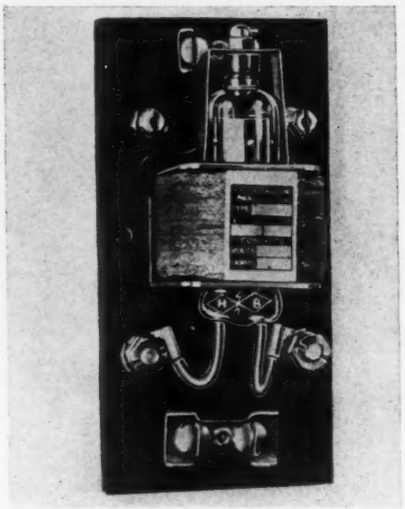


Indicating resistance thermometers; for measuring temperatures from minus 30 to plus 250 deg. F.; Model No. 1870 with 11-point switch pictured. **Wheelco Instruments Co.**, Chicago, Ill.

•

Mercury Plunger Switch

When the coil of this new mercury plunger switch is energized the plunger within the glass tube is pulled downward. This action displaces the mercury, which floods the contact and closes the circuit. Reverse of this process opens the circuit. A.c. relays and across-the-line starters are suggested applications.



Mercury plunger switch; 30 amp. or 1 hp. a.c. rating. **H-B Electric Co.**, Philadelphia, Pa.

•

Line Construction Truck

Two novel features distinguish this line construction truck, which provides space for a seven-man crew. Engine is equipped with a motor-mile recording tachometer, thus crediting engine for work done while operating the 15,000-lb. pull winch or stringing lines in low gear. Drinking fountain on cab supplies ice water for crew; water from storage tank above cab circulates through coil in ice chest within body. Unit is designed particularly for work in mountainous or isolated sections where there are no roads.

"Reo 2B7M;" cab and chassis standard Reo unit, all-steel body 13 ft. long built by **Modern Vehicle Co.**, San Francisco, Calif. Used by San Joaquin Light & Power Co. Weight with all equipment, about 16,000 lb.

Utilities State Position on A.S.A. Pole Standards

[*Continued from page 33*]

to present the general conditions confronting the power utilities, it is believed that the fundamental principles of the position of the power utility companies in reference to poles for transmission and distribution lines should be called to your attention.

In preparing this paper it was desired to emphasize the following factors:

1. The power utility companies represent an appreciable percentage of the purchasing power of poles.
2. In view of the fact that the supply of electric power to the consumers is interrupted unless the lines are supported upon poles in accordance with accepted standards, the failure of poles or the renewal of poles due to decay in many cases mean outages to service.
3. Due to the amount of equipment on distribution poles and to the inherent design requirements of transmission lines, a considerable expense of transferring equipment is involved in renewing poles.
4. From items 2 and 3 it can be seen that it is essential that power utility companies use poles having long life and be not subject to decay in their early life.
5. Since the condition of poles in the white prior to treatment is an important factor in the life of treated poles, our industry is deeply interested in the specifications for poles in the white and many companies believe that the present American Standards Association tentative standards require revising.

L. G. SMITH,
Chairman Timber Products Subcommittee, Transmission and Distribution Committee, Edison Electric Institute.

•

Hobart Starts New Employee Vacation and Benefit Plans

Under the terms of a new plan every employee of the Hobart Manufacturing Company with 25 or more years' service will receive an extra week's vacation with pay for each additional year he remains with the company.

The plan was announced by John M. Spencer, president and general manager, at a recent inauguration dinner of the Quarter-Century Club, which was attended by 79 employees with 25 or more years' service. Employees were also given a check for $2,500 with which to start a revolving loan fund, to be administered by them for their own benefit.

•

Manufacturers' Sales Off

Manufacturers' sales of electrical machinery, apparatus and supplies during April, as reported by 83 firms, were $13,152,000, a decrease of 2.5 per cent from March and of 28.8 per cent from April, last year, according to the Department of Commerce.

PREPARING POLES

FOR LIFETIME SERVICE

After selection of poles from live, straight trees, they are smoothly trimmed, roofed and gained before treatment. Full length Pressure Treatment with Creosote assures durability. Good appearance, as well as long service life, is an important feature. Plants for supplying your needs are located at convenient shipping points . . . thus assuring prompt service. On your next requirements, write for a quotation. Send for a copy of the booklet "Pressure Treated Timber."

THE WOOD PRESERVING CORPORATION
PITTSBURGH, PA.
Subsidiary
NATIONAL LUMBER & CREOSOTING COMPANY
TEXARKANA, TEX.-ARK.

a KOPPERS subsidiary

STATES TESTING EQUIPMENT

A PORTABLE TEST TABLE!

Form HA

Capacity—75 amps., 115-230 volts.
Dimensions: 15" x 20" x 20"

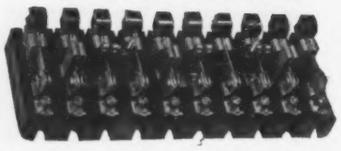
This table is designed for the company that wants a test position requiring little space and which can be moved around from place to place.

It is easily transported. It will test either socket type or bottom terminal meters.

See Cat. No. 1, Sec. 3B for Complete Data.

STATES TESTING EQUIPMENT

Another FIRST for STATES "SJ" Test Blocks



You can now select switch knobs from twelve different *molded thru* colors. A very practical idea for a lasting means for coding, and a big help in wiring.

Many standardize on STATES blocks because:—

1. **NO live parts extend beyond base—an important safety feature.**
2. **Wide selection of pole arrangements.**
3. **No lacquer used on switch parts—therefore good contacts are assured at all times, and**

eight more distinctive features.

Full details in Cat. No. 1, Sec. 9

*******TEAR OFF AND MAIL TODAY*******

To THE STATES COMPANY
Hartford, Conn.

Please send full information on STATES Test Blocks and STATES Test Tables.

NAME .....
TITLE .....
FIRM .....
CITY ..... STATE .....

Municipal Plants

LONOKE, ARK.—Application for a loan and grant for a municipal light and power plant has been made to the WPA by the city council. Mayor George C. Bailey stated that if the grant of 45 per cent and loan of 55 per cent were approved, the plant probably would be ready for operation by fall.

CALIFORNIA—Arguments have been begun in the superior court at Oroville before Judge J. O. Moncur of Plumas County on a petition filed by Henry G. DeGarmo, a former director of the Bidwell Municipal Utility District and two Durham residents, seeking to obtain a preliminary injunction halting a special election called for June 28 to decide whether the district shall be dissolved. Directors of the district filed a demurrer to the petition. The attorneys for the petitioners seeking the injunction maintain there are no provisions of law allowing the directors to call a special election and the result of such an election, if held, would be void.

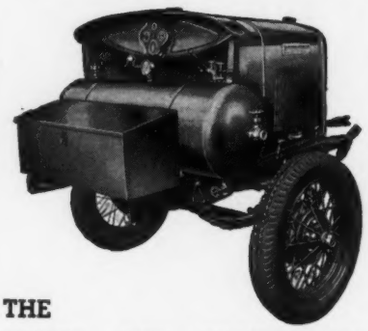
AURORA, IND.—An order in circuit court has upheld the right of the city to acquire through condemnation proceedings the Aurora property of the Public Service Company of Indiana. The ruling was based on a 1933 legislative act providing for municipal ownership through condemnation proceedings. An appraisal committee was named by the court to report at the October term.

LEBANON, IND.—Indiana Supreme Court has instructed the circuit court at Lebanon to grant that city's petition for appointment of appraisers to set a value on the utility's property in that city. The court ruled against the utility company in a charge that the city was attempting to confiscate its property without due process of law.

MAQUOKETA, IOWA—City may proceed with plans for the erection of a $95,000 addition to the city municipal electric plant, according to an indirect ruling of the Iowa Supreme Court. Chief Justice Carl B. Stiger denied the application of the Iowa Electric Company, asking for a stay order to prevent the carrying out of a Jackson County district court ruling which dissolved a temporary injunction the electric company had obtained against the city. The ruling of the supreme court means that the high court will not interfere to prevent the erection of the plant addition.

THAYER, MO.—By order of the Missouri Public Service Commission, the Arkansas-Missouri Power Company must continue electric light and power service in Thayer until further notice by the commission. The commission held that the company acted improperly in discontinuing service April 15 without authority of the commission. The company shut off its service in a dispute with the city over construction of a municipal power plant which had been begun. Service was restored temporarily the following night on order of the commission pending a hearing.

MCCOOK, NEB.—City officials and officers of the Nebraska Light & Power Company have come to terms on the private versus public power issue whereby the city has agreed not to start condemnation proceedings immediately and the company agrees not to sell its property without 90 days' notice to the city. The accord climaxed a period in which the city proposed to start condemnation proceedings before Nebraska's public hydro-electric districts



THE SMITH AIR COMPRESSOR

***means* LOW-COST Compressed Air**

For drilling rock, breaking pavement, riveting sand blasting, spray painting and general use with pneumatic tools. Used the world over to replace large, cumbersome compressors on a majority of all compressor work. Powered by a FORD MOTOR it gives smooth, low-cost performance.

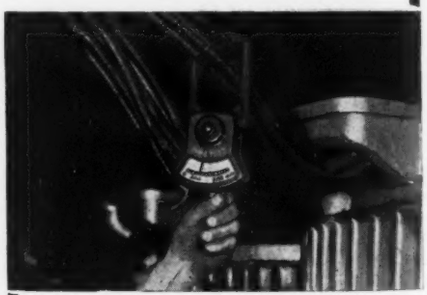
Write for our new folder: "A Picture Story of the Smith Air Compressor." It illustrates the many uses of the Smith Compressor and Compressors as built by users of the Smith Compressor Head and Accessories.

With a Ford Motor and shop facilities you can assemble your own compressor. We will furnish a Smith Compressor Head and Accessories with instructions for mounting.

Address Inquiries to Desk O

GORDON SMITH & CO., Inc.
BOWLING GREEN, KY.

TONG TEST - - the quickest way to check loads



Equip your service men with Tong Test Ammeters and watch the results! More lines will be checked in a given time and costs will be cut because Tong Test makes current measuring a simple, five seconds job. Just encircle Tong Test around the conductor and take the reading—instantly, accurately and safely—without opening the line or stopping production.

Tong Test measures A.C. or D.C. up to 800 amperes—cannot burn out—weighs only 2¾ pounds and can be used anywhere. Get complete data on this great little instrument—and the Voltor attachment for measuring voltage—by sending for the Tong Test bulletin today.

COLUMBIA ELECTRIC MFG. CO.
4529 Hamilton Ave. Cleveland, O.

SHERMAN *for* LOW COST SAFE QUICK CONNECTIONS

- tough bronze
- full thread engagement
- no sharp edges
- large or small head

For primary, secondary service, and transformer solderless line taps. Bolt, spacer, and nut an integral assembly. Strong.

SOLDERLESS SERVICE CONNECTORS

SC-4X

SC-6

Assembly

WEDGE-GRIP CONNECTORS

- For service entrance and all small wire connections. New, Economical, Simple construction. No lost screws—no connectors thrown away—no lost time. Two types of screw of tough bronze with copper body. Can be furnished in wide range of sizes to accommodate different wire capacities — #12 stranded to #4 stranded.

Get samples and Trade Bulletin No. 22.

H. B. SHERMAN MFG. CO.

BATTLE CREEK, MICH.

could acquire the McCook facilities, or before other interests could buy them. The city, under the mutual adjustment, agrees to refrain from taking any further action to place a proposition for the condemnation of the properties of the utility upon the ballot at the general election on August 9.

SCOTTSBLUFF, NEB.—City council has begun condemnation proceedings against local properties of the Western Public Service Company and at the same time called a special city election for August 14 to vote on acquisition of the facilities. A council spokesman stated the group took the action at a meeting after members agreed "Scottsbluff can get a better purchase price through its own action than by messing around with the public power projects." Acquisition of the Scottsbluff properties has been proposed by the state's three major hydro-electric districts under their plan to buy all the private power companies in the state. C. B. Fricke, president of the Loup River public power district, in commenting on this action by the Scottsbluff council, said: "If the Scottsbluff council buys the Western Public Service Company property there won't be very much else left for the hydro-electric districts to purchase. The best part of the system is in Scottsbluff." Mr. Fricke stated the action of the council "is unfortunate, to say the least. If they had just waited to see how things develop they wouldn't lose anything, and they might gain a great deal by going along with us in our program."

YORK, NEB.—W. G. Liggett was granted a temporary restraining order by District Judge Landis preventing the city from proceeding under contract with Robert Fulton, Lincoln engineer, for drafting of plans and specifications for construction of a municipal light and power plant. Mr. Liggett charged in a petition filed in district court the contract is "inherently unconscionable", provides for an "excessive and exorbitant" amount to be paid the special engineer, constituted "legal fraud" upon the city and its taxpayers and provides for "premature payment of monies set forth in the contract." No date for a hearing on whether the injunction shall be made permanent was set. Its effect, city officials said, was to halt temporarily proceedings for building a power plant.

SANDUSKY, OHIO—City commission has instructed City Manager Wagar to ask the Ohio Public Service Company the lowest price it will accept for its electric plant and system in this city. The committee's action is preliminary to the enactment of legislation to borrow government funds for a municipal plant. An earlier attempt to obtain a municipal plant failed.

WEATHERFORD, TEX.—In a recent decision by Judge J. E. Carter of the district court in Weatherford it was held that the municipal election last November in which it was voted to issue $600,000 of revenue bonds for construction of municipal electric light and power and waterworks plants was valid and binding. Judge Carter denied a petition of the Texas Public Utilities Corporation for an injunction against the city, restraining issuance of the bonds. Contentions of the utility that in such a bond issue a "legal voter" must own and render real estate, and that a property owner must personally render his property for taxation to become eligible to vote, were denied by the court. Notice of appeal was given. Of the $600,000 authorized, $250,000 would

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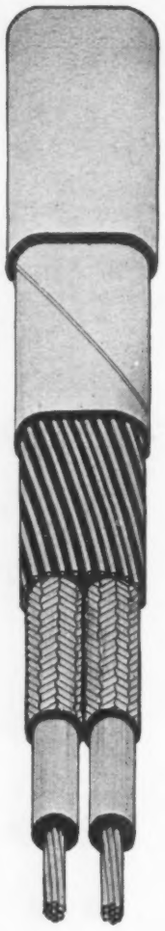

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be used on constructing a municipal electric plant and $350,000 to build a waterworks system.

LEXINGTON, VA.—Town council has instructed Town Manager H. B. Rice to execute and file an application for a PWA grant to aid in financing the construction of an electric power plant and distribution system.

OLYMPIA, WASH.—Two days after the voters granted the Puget Sound Power & Light Company a twenty-five year franchise extension, the County Commissioners of Thurston County (of which Olympia is the county seat), passed a resolution placing the question of forming a county-wide public power district on the November ballot.

EDGERTON, WIS.—Circuit Judge A. C. Hoppmann has affirmed an order of the state Public Service Commission setting a price of $95,000 at which the city could acquire the local plant. Citizens voted in 1933 to acquire the local electric property, but the utility declared the commission's price was invalid because it neglected to include certain property as part of the electric plant, that the compensation fixed was unlawful and that the terms of the acquisition were unreasonable.

CAMBRIDGE, WIS.—Circuit Judge A. C. Hoppmann has approved the purchase by the village of the electric plant from the Wisconsin Power & Light Company. The state Public Service Commission in 1935 ordered the company to sell the system to the village for $25,000. Wisconsin Power & Light Company appealed the commission's order. Citizens voted in 1934 for the acquisition by 157 to 92.

Recent Rate Changes

GULF PUBLIC SERVICE COMPANY has been ordered by the Louisiana Public Service Commission to reduce its rates $50,000 a year in 22 Louisiana communities. The reductions range from 9 to 19 per cent and average 12 per cent. Reductions were made following agreement between the utility and the commission with no investigation charges made.

MISSISSIPPI POWER COMPANY has announced a reduction in electric power and light rates totaling $190,000 annually affecting municipalities served in east central and south Mississippi.

TAMPA ELECTRIC COMPANY has announced a reduction of commercial electric rates throughout its territory of Hillsborough, Pasco and Polk counties. The reduced schedules will result in annual saving to consumers of $90,000. The readjusted rate is as follows: first 150 kw.-hr. per month, 9 cents per kilowatt-hour; next 2,850 kw.-hr. per month, 5 cents per kilowatt-hour; over 3,000 kw.-hr. per month, 2 cents per kilowatt-hour; minimum bill, $1 per month. The new electric rate applies to stores and other business enterprises and does not affect the residential rate or any other rates, officials of the company stated. "A number of our customers have made inquiry about the matter and we wish to correct the impression that the residential rate has been increased," they said.

TICONDEROGA ELECTRIC LIGHT & POWER COMPANY has filed a new schedule of electric rates with the New York Public Service Commission which provide for a general reduction in rates that will save

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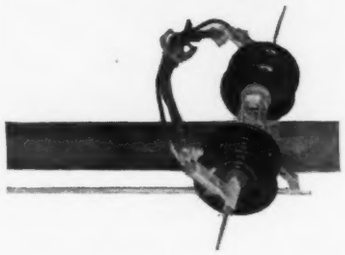

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customers of the company about $8,400 annually. It is estimated that residential users will save about $3,000 annually under the new rates and none will be increased. Commercial customers will save more than $5,000 annually.

CANTON ELECTRIC LIGHT & POWER COMPANY has filed revised electric rates with the New York Public Service Commission as the result of negotiations conducted by the commission and the revisions provide for a reduction for consumptions in excess of 200 kw.-hr. per month. The revision is estimated to bring reductions totaling about $1,000 annually.

NEW YORK PUBLIC SERVICE COMMISSION has denied the petition of the Village of Tupper Lake for an extension of time within which to make effective the reduced electric rates recently ordered. In April the commission directed the village to make reductions in electric rates which would save customers of the municipal electric plant about $12,000 annually. The order fixing the lower rates required that they be made effective on May 1. The commission granted a thirty-day extension. Now the village has asked for a further extension, but this last request the commission has denied.

•

Allots Rural Funds; Contracts Awarded

Rural Electrification Administration has recently announced the following allotments:

ALABAMA—Southeast Alabama Electric Membership Corporation, $184,000, to build 249 miles of line, 702 customers in Butler, Dallas, Wilcox and Lowndes counties.

GEORGIA—Cobb County Rural Electric Membership Corporation, $143,000 to build 160 miles of line, 914 customers in Cobb, Cherokee and Fulton counties.

IDAHO—Kootenai County Rural Electric Association, $214,000 to build 205 miles of line, 663 customers in Kootenai and Benewah counties, Idaho, and Spokane county, Washington.

LOUISIANA — Washington-St. Tammany Rural Electric Membership Corporation, $102,000, to build 115 miles of line, 356 customers in Washington, St. Tammany and Tangipahoa parishes.

OKLAHOMA—Caddo County Electric Cooperative, $130,000, to build 134 miles of line, 585 customers in Caddo, Kiowa, Canadian, Blaine and Washita counties.

SOUTH CAROLINA—South Carolina State Rural Electrification Authority, $228,000, to build 254 miles of line, 1,118 customers in Florence, Richland, Calhoun, Georgetown, Marlboro, Dillon, Clarendon, Colleton and Newberry counties.

TENNESSEE—Tri-County Electric Membership Corporation, $211,000, to build 202 miles of line, 1,277 customers in Macon, Sumner, Trousdale and Clay counties.

VIRGINIA—Craig-Boutetourt Electric Cooperative, $70,000, of which $30,000 will be used to build approximately 28.2 miles of line to serve some 116 customers in Monroe County, W. Va., and $40,000 will be used to build approximately 40 miles of line to complete the lines in Craig and Botetourt counties, Va.

NORTH DAKOTA—Tri-County Electric Cooperative, $102,000, to build 81 miles of line, 502 customers in Foster, Griggs and Eddy counties.

OHIO—Guernsey-Maskingum Electric Cooperative, $274,000, to build 273 miles of

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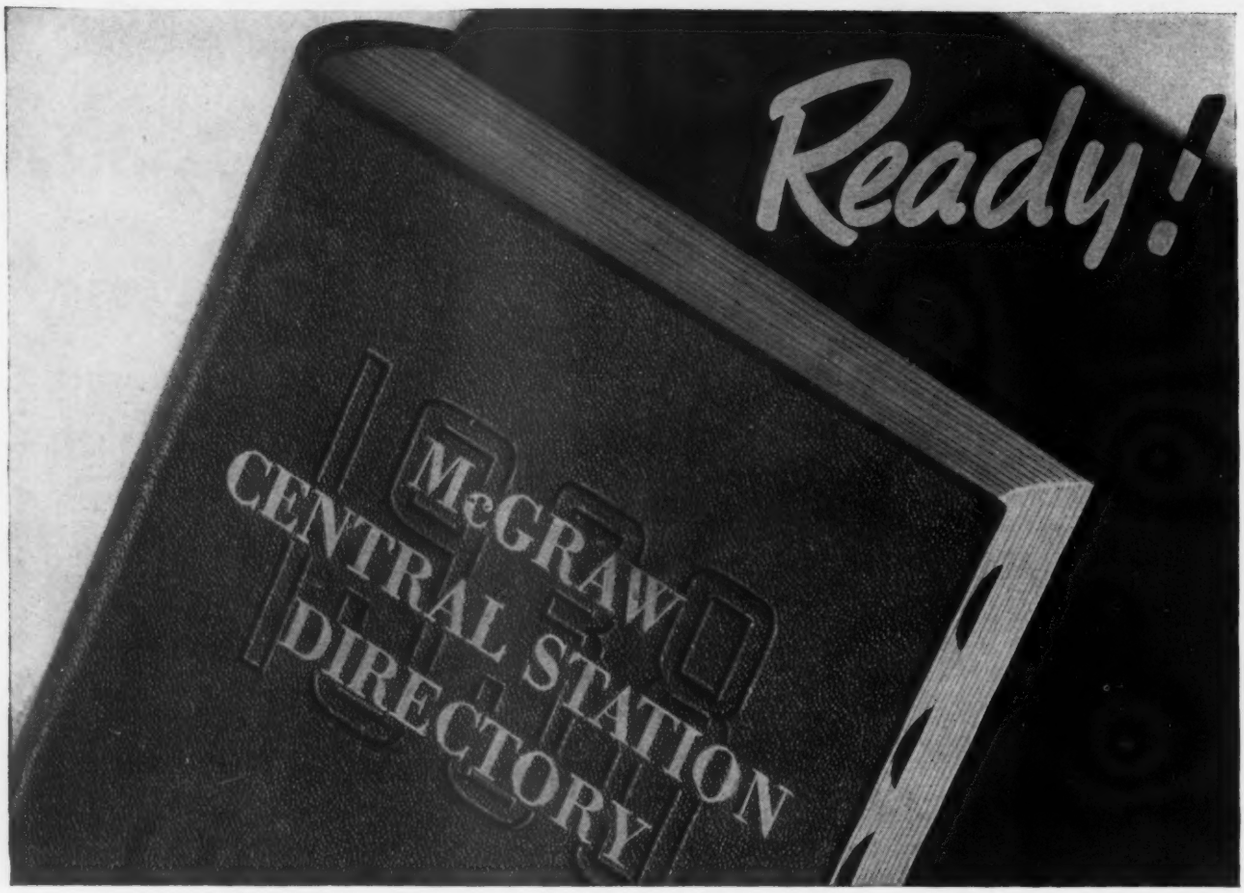

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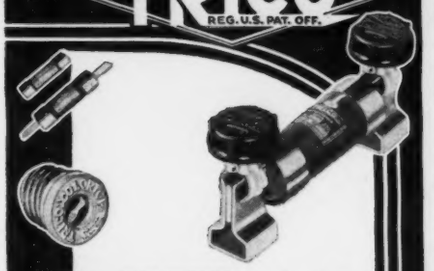

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Construction contracts recently awarded follow:

GEORGIA—Lamar Electric Membership Corporation to Richard Bros., Carrollton, Ga., for building entire project, consisting of 144 miles of line, $76,312.

IDAHO—Clearwater Valley Light and Power Association to Homer G. Johnson, Portland, Ore., for building third section of project, consisting of approximately 153 miles of line $136,781.

MICHIGAN—Fruit Belt Electric Co-operative, to Laird Construction Co., Battle Creek, Mich., for building second and third sections of project, consisting of 112 miles of line, $108,462. O & A Electric Co-operative to Laird Construction Company, Battle Creek, for building the first section of project, consisting of 175 miles of line, $133,107.

MINNESOTA—Lake Region Co-operative Electrical Association to E. W. Wylie, Inc., St. Paul, for building first 127 miles of project, $121,674.

•

FPC Issues Revised "Rules of Practice and Regulations"

New "Rules of Practice and Regulations," with approved forms for applications, reports, notices and certificates, have been issued by the Federal Power Commission, effective June 1, 1938.

Copies of the new rules and regulations may be secured from the Superintendent of Documents, Washington, D. C., at 15 cents a copy.

•

World Electrical Statistics

Statistical information of interest to the electrical industry is contained in the Fourth Annual Statistical Number of "Electric and Radio World Trade News" issued by the Electrical Division of the Bureau of Foreign and Domestic Commerce. Data assembled from various sources relate to the electric light and power industry, electrical manufacturing, radio, rural electrification, imports and exports. World statistics include electric energy production, generator capacity, number of consumers, power consumption by countries.

The same material appears also as Statistical Supplement No. 2 of World Electrical Markets, another series issued by the Electrical Division.

•

Indian Pact Carried On

Buffalo Niagara Electric Corporation has been authorized by the New York Public Service Commission to extend its electric system into and across the Tuscarora Indian Reservation in Niagara County. The extension is to be made in accordance with the terms of a contract entered into between the company and the Tuscarora Nation of Indians.

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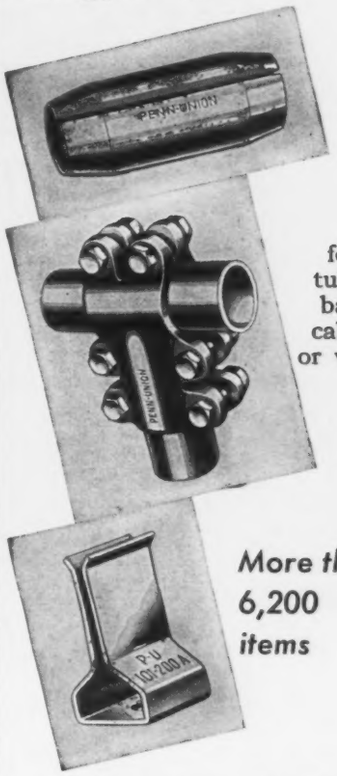

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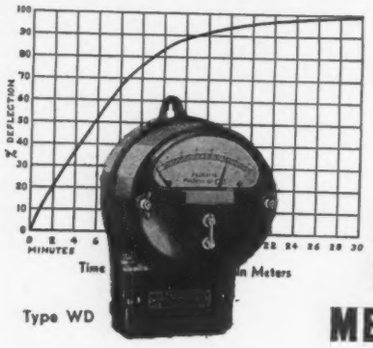

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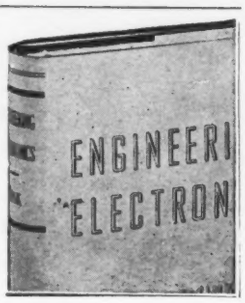

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Sales Opportunities

PORTLAND, ORE.—Portland General Electric Company, Portland, has approved plans for extensions in 24,000-volt transmission line in Willamette Valley area, including a number of new primary and secondary lines for rural electrification and expansion in facilities in different towns now being served in that district, including Hubbard and Woodburn. Five new outdoor power substations will be built. Work is scheduled to begin at once. Cost estimated over $1,000,000. Project is part of 1938 development program of company.

BUFFALO, N. Y.—Wickwire-Spencer Steel Company, River Road, plans installation of motors and controls, conveyors, electric hoists and other equipment in new wire mill at local plant. Cost close to $500,000. Work will be carried out in conjunction with general expansion and modernization program at plant, for which an additional fund has been arranged. Main offices of company are at 41 East Forty-second Street, New York, N. Y.

BELMOND, IOWA—Has plans maturing for new municipal electric power plant and has called special election on June 20 to approve project, including financing in amount of $120,000.

TWIN FALLS, IDAHO—Idaho Power Company, Boise, Idaho, plans rebuilding portion of power plant at Twin Falls, recently damaged by fire, caused by lightning. An official estimate of loss has not been announced.

TACOMA, WASH.—Municipal Utilities Department plans early construction of a new 6000-kv. power substation in conjunction with extensions in distributing lines. Appropriation has been authorized.

HUNTINGTON, W. VA.—United States Engineer Office, Huntington, will take bids soon for electrical and mechanical equipment required for proposed flood control construction at Huntington and Kenova, W. Va. Purchases are estimated to total about $100,000.

VANCEBURG, KY.—Lewis County Board of Commissioners has authorized a bond issue of $148,000 for new electric power plant and will begin work on project at early date.

OLEUM, CALIF.—Pacific Gas & Electric Company, San Francisco, has secured permission from California State Railroad Commission to construct and operate proposed steam-electric generating plant at Oleum, in conjunction with oil refinery of Union Oil Company of California at that place, recently referred to in these columns, and will proceed with project at early date. Cost estimated at $5,000,000. Company will make extensions in transmission lines in that district.

SCHUYLER, NEB.—Has engaged Black & Veatch, 4706 Broadway, Kansas City, Mo., consulting engineers, to make surveys and estimates of cost for extensions and improvements in municipal electric power plant, including installation of additional equipment.

HUNTINGTON PARK, CALIF.—Desser Tire Products Company, 6211 Cottage Street, plans installation of motors and controls, conveyors, electric hoists and other equipment in connection with proposed rebuilding of portion of rubber mill recently damaged by fire. Loss estimated close to $400,000.

HARTFORD, CONN.—Hartford Electric

Light Company plans reconstruction of a section of transmission line in Brainard airfield area, where new right-of-way has been acquired. Cost estimated over $75,000.

WASHINGTON, D. C.—Motors and controls, transformers and accessories, conveyors, electric hoists, electric cranes and other equipment will be required for proposed expansion in navy yard at Pearl Harbor, T. H., to be carried out under direction of Bureau of Yards and Docks, Navy Department, Washington, for which an appropriation of over $10,000,000 is being arranged. Primary work will include a new graving drydock and auxiliary structures at cost of about $8,485,000; new electric shop building and accessories, $465,000; pipe and copper shop unit with accessories, $150,000; galvanizing shop and accessories, $85,000; personnel building and accessories, about $1,300,000. Plans are scheduled to be prepared soon.

TRUMAN, MINN.—Has authorized a bond issue of $104,000 for proposed municipal electric power plant. Financing will be arranged through Federal aid. Work is scheduled to begin in near future.

NEW HAVEN, CONN.—United Illuminating Company has taken out a permit for proposed new power substation on George Street, for which erection contract recently was let to Mott-Mohr Construction Company, 440 Elm Street, and work is being placed under way.

HUNTINGTON, W. VA.—Appalachian Electric Power Company, Roanoke, Va., has arranged for purchase of property at Seventh Avenue and Eleventh Street, Huntington, as site for new service and operating building, with office facilities. Meter, cable and other equipment departments will be installed. Cost estimated over $350,000. Plans will be prepared soon.

SHELBY, MONT.—Producers' Refinery Company, Shelby, care of James W. Johnson, Shelby, recently formed with capital of $1,000,000 by Mr. Johnson and associates, plans installation of motors and controls, transformers and accessories, conveyors, electric pumping machinery and other equipment in new local oil refining plant, for which a site has been selected. Cost over $500,000. Proposed to begin work soon. Others interested in new company include G. C. Hoyt and M. H. Kluth, both of Shelby; and D. M. Drumheller, Jr., and W. E. Burke, both of Cut Bank, Mont.

COLUMBIA, TENN.—Has plans maturing and will take bids soon for municipal electrical distributing system, including transmission line for connection with high-tension system of TVA, from which power will be secured. Also for power substation and equipment. Cost close to $200,000. Financing has been arranged through Federal aid. Freeland, Roberts & Company, Third National Bank Building, Nashville, Tenn., are consulting engineers.

GERING, NEB.—Bureau of Reclamation, Guernsey, Wis., has plans nearing completion for new power substation at Gering, linking Federal power lines in parts of Nebraska, Wyoming and Colorado. Cost about $100,000 with transformers, switchgear and auxiliary equipment.

ATHENS, TENN.—Plans early acquisition of local lines of Tennessee Electric Power Company, to be operated as municipal distributing system in future. Extensions and improvements will be made, including construction of a transmission line for connection with high-tension system of TVA, from which power will be secured.

What Price Navigation

[*Continued from page 62*]

ley for not to exceed 4 mills per kilowatt-hour."

All of which answers a question about which even Uncle George Norris has begun to wonder: Why the delay, since 1933, in making allocations by the TVA?

On August 22, 1933, David E. Lilienthal was in a hurry for such allocations. He had the board adopt a resolution authorizing him to proceed with such a report. In 1935 Congress, in passing the TVA amendments, demanded by law such allocations. They have still to be made.

"Mr. Lilienthal," said Dr. A. E. Morgan to the congressional investigating committee, "has favored treating power as a by-product, charging against power only the actual cost of the power houses and power facilities, and with no part of the cost of the dam or reservoir. I hold that would be a subterfuge. While constitutionally electric power is subordinate to navigation, in practical importance and interest, with many of those who promoted the TVA act it has been dominant, and was one of the principal reasons for establishing the authority. But for the power issue, the TVA dams would never have been built. To deny that is sheer hypocrisy, and to treat power according to Mr. Lilienthal's by-product theory is a subterfuge."

One suspects that navigation and flood control are going to be just a bit overcapitalized when Lilienthal's five years of effort produce those allocations!

•

Roaster Sales Rise in 1937

The market for household electric roasters is in a highly favorable condition, according to the results of a study made by Arthur Hirose, director of research, *McCall's Magazine*, for the electric roaster manufacturers, who are affiliated with the domestic appliance section of the National Electrical Manufacturers Association.

This new study, presented to the manufacturers at their recent Hot Springs, Va., meeting, points out that electric roaster sales were five times as great last year as they were in the year 1934. Although only about four years old, the electric roaster ranked fifth in unit sales last year among the household electrical appliances selling at retail for more than $20.

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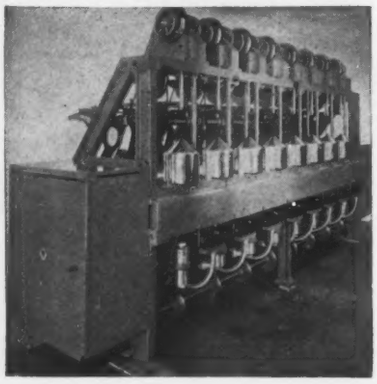

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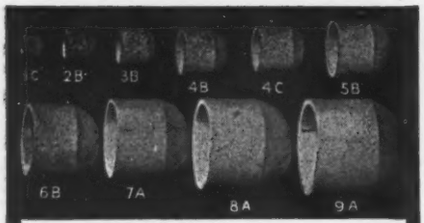

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Applied Data Betters Distribution Performance

[*Continued from page 59*]

A voltage regulation chart (Fig. 6) for each feeder can be prepared from data supplied by the skeleton map, the regulation chart and table of voltage rise due to capacitors.

The selection of the amount and location of shunt capacitors can be determined from the 24-hour load graph of the primary feeder. This graph shows the 24-hour variations in the kvar. of the feeder. By averaging this quantity a figure will be obtained which in most cases will produce the desired results. Some latitude is allowable in this respect, a larger amount of capacitance produring a greater amount of power-factor correction and an increased voltage rise. The latter must be recognized as a limiting factor, since the voltage rise at minimum load should not be so great as to exceed the permissible correction obtainable from the feeder voltage regulators.

In general, the location of the capacitors can be determined by allocating the total capacitance to the various feeder sections in proportion to their respective average peak loads. Where special loads obtain, or where an unusual regulation problem exists, the general principle of capacitor allocation may be modified to produce more desirable results.

One of the trends in modern distribution practice is toward the use of the so-called "unit substation," which may be either built up of an assembly of component parts by the utility company or purchased as a complete factory assembly. Such a substation usually consists of a step-down transformer of from 750 to 3,000 kva. capacity, which steps down the transmission voltage to 4 kv. for supply to a regulated bus, either through load ratio control integral with the transformer or by means of a separate regulator. From the regulated bus, anywhere from one to four 4-kv. feeders emanate to the distribution system, which may be of the radial or network type.

If the system is of the radial type care must be exercised in the application of this type of substation, to make sure that bus regulation will be adequate for the various feeders supplied, since they may differ somewhat in load characteristics and length. In this connection the use

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of capacitors to aid in voltage regulation may furnish enough aid to the longer feeders or to those having the lowest power-factor characteristics to enable the unit substation with bus regulation to be used.

If the system is of the primary network type the voltage regulation problem is usually non-existent, due to the fact that feeders are ralatively short and are supplied from both ends.

In arriving at the answer to the question as to whether the installation of capacitors is economically justifiable, one must balance the cost of the capacitor installation against the increased consumption of energy due to the maintenance of better average voltage conditions on the feeder, the reduction in feeder losses due to increased power factor, the increase in feeder kw. carrying capacity due to the decrease in reactive power, and to the releasing of generating, transmission and substation capacity due to improved power factor. In many cases the mere evaluation of any one of these factors may show sufficient justification for the capacitor installation, while in others a complete economic analysis may be desirable.

•

Adequate Wiring Program Assists Utility Activity

J. R. Waters, Jr., residential promotion manager of the Monongahela West Penn Public Service Company, Fairmont, West Va., reports that the National Adequate Wiring Program will materially assist the company's wiring activity. The certification phase of the national program is of special interest, as is the fact that adequate wiring is now receiving national publicity through women's magazines, architectural and building papers and radio.

The Monongahela territory covers approximately 13,000 square miles in West Virginia, Maryland, Ohio and Virginia. For the past five years this organization has been conducting an educational campaign, through its domestic representatives, designed to sell home owners the many advantages of adequate wiring.

•

Gets Regulator Contract

Los Angeles Water and Power Commission was awarded a contract to Westinghouse Electric & Manufacturing Company for a quantity of feeder voltage regulators at $70,272.

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